



PROJECT SPECIFICATIONS
A/E #24-009A



FOR THE

JOHNSON COUNTY ARKANSAS
COURT ADDITION & RENOVATION

301 Porter Industrial Road
Clarksville, AR 72830

FOR THE



JOHNSON COUNTY GOVERNMENT



January, 2025



Spirit Architecture Group, LLC
108 E Mulberry Street
Collierville, Tennessee 38017
901/457-7688 (O)
901/457-7689 (F)

Smith-Doyle Contractors, Inc.
1635 Wynne Road
Cordova, Tennessee 38016
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PART 1 GENERAL

1.01 GENERAL INFORMATION:

1.02 The "Instructions to Bidders" by the American Institute of Architects, AIA Document A701-1997" are hereby made a part of the Specification by Reference. Refer to Construction Manager (CM) Instructions To Bidders and Bid Documents for Johnson County Court Addition & Renovation – Dated 01/27/25, for additional bidding requirements. In the event of conflicting requirements, the most restrictive shall apply. Notify CM in writing to request interpretation of any such conflicts

1.03 Johnson County, Arkansas is a county with a population of approximately 25,750+. The county seat is Clarksville.

1.04 Where the term "County" is used, it shall refer to Johnson County, Arkansas. The laws of Arkansas shall apply and control any contract that is awarded.

1.05 The County is an Equal Opportunity Employer and does not discriminate based upon religion, race, creed, national origin or gender. Participation by Small Minority and Women's Businesses is encouraged.

1.06 PURPOSE AND SCOPE OF THE PROJECT:

1.07 The County intends to construct a new courtroom, clerk's area, public area and renovating the existing facility for total floor area of approximately 9,000 square feet on county property located at -301 Porter Industrial Road, Clarksville, Arkansas. Refer to Section 01 11 00 Summary of Work for additional information.

PART 2 BIDDING

2.01 BIDDING DOCUMENTS:

2.02 Bidding Documents may be examined at the offices of the Construction Manager:

Smith-Doyle Contractors, Inc.
1635 Wynne Road
Cordova, TN 38016
Contact: Jason Roberts
Telephone No.: (901) 213-3993
Fax No.: (901) 213-3994

Copies of Bidding Documents and Bid Forms may be obtained from the office of the Construction Manager. **No partial sets of documents will be issued.** If more than one set of bidding documents is desired, additional sets may be obtained upon payment of actual cost of printing plus postage.

ALL BIDS MUST BE SUBMITTED ON BID FORMS PREPARED BY AND ISSUED BY THE CONSTRUCTION MANAGER IN SEALED ENVELOPE IN ACCORDANCE WITH INSTRUCTIONS PROVIDED HEREIN.

PART 3 CONTRACT RELATIONSHIPS

3.01 The County has arranged for the services of Smith-Doyle Contractors, Inc. as Construction Manager for the entire project.

3.02 The County will contract directly with the parties submitting the best and most responsive bids, as further described herein, for various subdivisions of the work, such sub-divisions defined in the document entitled Scope of Work for each specific bid package.

- 3.03 Those contractors performing on-site work will enter into a contract agreement with the County using AIA Document A132-2019, Standard form of Agreement between Owner and Contractor, Construction Manager as Adviser Edition, where the basis of payment is a Stipulated Sum.
- 3.04 Those vendors who will supply materials only not involving any on-site work will be issued a Purchase Order by the County.

PART 4 MISCELLANEOUS PROVISIONS

4.01 SALES TAXES:

4.02 The County is not exempt from state and local taxes. All bids, both for on-site work and for material supply only, are to include all applicable sales and/or use taxes, state and local taxes.

4.03 INDEMNITY PROVISIONS:

4.04 Each bidder is to include provisions in its Bid to incorporate the following Indemnity Provisions into its scope of work. This Indemnity Provision shall be part of the Contract and/or Purchase Order Agreement between each successful Bidder and the Owner.

- A. To the fullest extent permitted by law, the Contractor and its subcontractors shall indemnify and hold harmless the Owner, Architect and Construction Manager and their agents and employees from and against all claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of or resulting from the performance of the Work provided that any such claim, damage, loss or expense (1) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including the loss of the use resulting therefore, and (2) is caused in the whole or in part by any negligent act or omission of any Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder. Such obligation shall not be constructed to negate, abridge, or otherwise reduce any other right or obligation of indemnity, which would otherwise exist as to any party or person, described in this paragraph.
- B. In any and all claims against the Owner, Architect or the Construction Manager or any of their agents or employees by any employee of any Contractor, any Subcontractor, anyone for whose acts any of them may be liable, the indemnification obligation under this paragraph shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for any Contractor or any Sub-contractor under worker's or workmen's compensation acts, disability benefits acts or other employee benefits acts. In the event any provisions or portion thereof should be deemed illegal or unenforceable, then all the remaining terms of this provision shall be fully legal and enforceable.

END OF SECTION

PART 1 GENERAL

1.01 INVESTIGATION OF SITE BY BIDDERS:

- A. Construction Drawings referenced in Section 00 01 15, Index of Drawings, indicate the existing site conditions, adjacent roadways and construction required for this Project, more specifically identified in the drawings. All Bid Package Bidders are urged to review the existing site along with all Contract Documents, and all Bid Packages assembled by the Construction Manager, prior to bidding, to ascertain the existing and new conditions under which they will be required to complete their work under this Contract.
- B. The Owner, Construction Manager and Architect disclaim any responsibility for the interpretation, investigation, or accuracy of any on-site evaluations by the Bidder. The bidder is solely responsible for verifying all existing data, conditions, and/or work required to complete all work, in full, as required by his contract.
- C. Each Bid Package Bidder is urged to verify all existing conditions prior to beginning his work to be certain that conditions shown as existing do exist. If inconsistencies are noted, the Construction Manager is to be notified in writing, immediately, for resolution with the Architect, Owner, and others prior to beginning work. Claims for delays in this regard will not be entertained by the Owner. Execution of work constitutes acceptance of existing conditions by the Bidder.
- D. Site conditions and contour grades of the above work have been provided to the Architect based on the survey provided by the Owner. The Contractor is urged to verify existing grades and contours prior to beginning his work to be certain that grades shown as existing do exist. If inconsistencies are noted, the Construction Manager is to be notified in writing, immediately, for resolution with the Architect, Owner, and others prior to beginning work. Claims for delays due to inconsistencies will not be entertained by the Owner. Execution of work constitutes acceptance of existing grades.

1.02 SOILS AND FOUNDATION REPORT:

- A. Soil sub-surface investigations were conducted by the Owner's Agent at the site for design purposes of the Architect only. The results of these investigations are found in a copy of the report and are available in Section 00 31 32 Geotechnical Requirements.
- B. The Owner, Construction Manager and Architect disclaim any responsibility for the accuracy, true location and extent of the soils investigation that has been prepared by others. They further disclaim responsibility for interpretation of that data by Bidders, as in projecting soil-bearing values, rock profiles, soil stability and the presence, level, and extent of underground water.
- C. Bidders are urged to make their own investigation of the site before bidding. Bidder is solely responsible for verifying all existing data, conditions, and/or work required to complete all work, in full, as required by their Contract.

1.03 BIDDER'S RESPONSIBILITY:

- A. The Owner, Construction Manager and Architect disclaim any responsibility for the interpretation or investigation of any Documents on on-site evaluations referenced above by the Bidder. Bidder, by submittal of his Bid, acknowledges that he is solely responsible for verifying all existing data, conditions, and/or work required to complete all work in full as required by his Contract and he has investigated all buildings, drawings and data to his satisfaction. Claims to the contrary will not be entertained by the Owner after bids are received.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

- A. The following Tentative Schedule in this section establishes the approximate major deadlines to be used by the Contractor during bidding on this project. The contractor shall allow for a minimum 90-day variance from these dates during bidding. The actual Construction Schedule will be issued in accordance with Section 01 32 16.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION

GEOTECHNICAL REQUIREMENTS 00 31 32

PART 1 GENERAL

SUMMARY

A. GENERAL DESCRIPTION

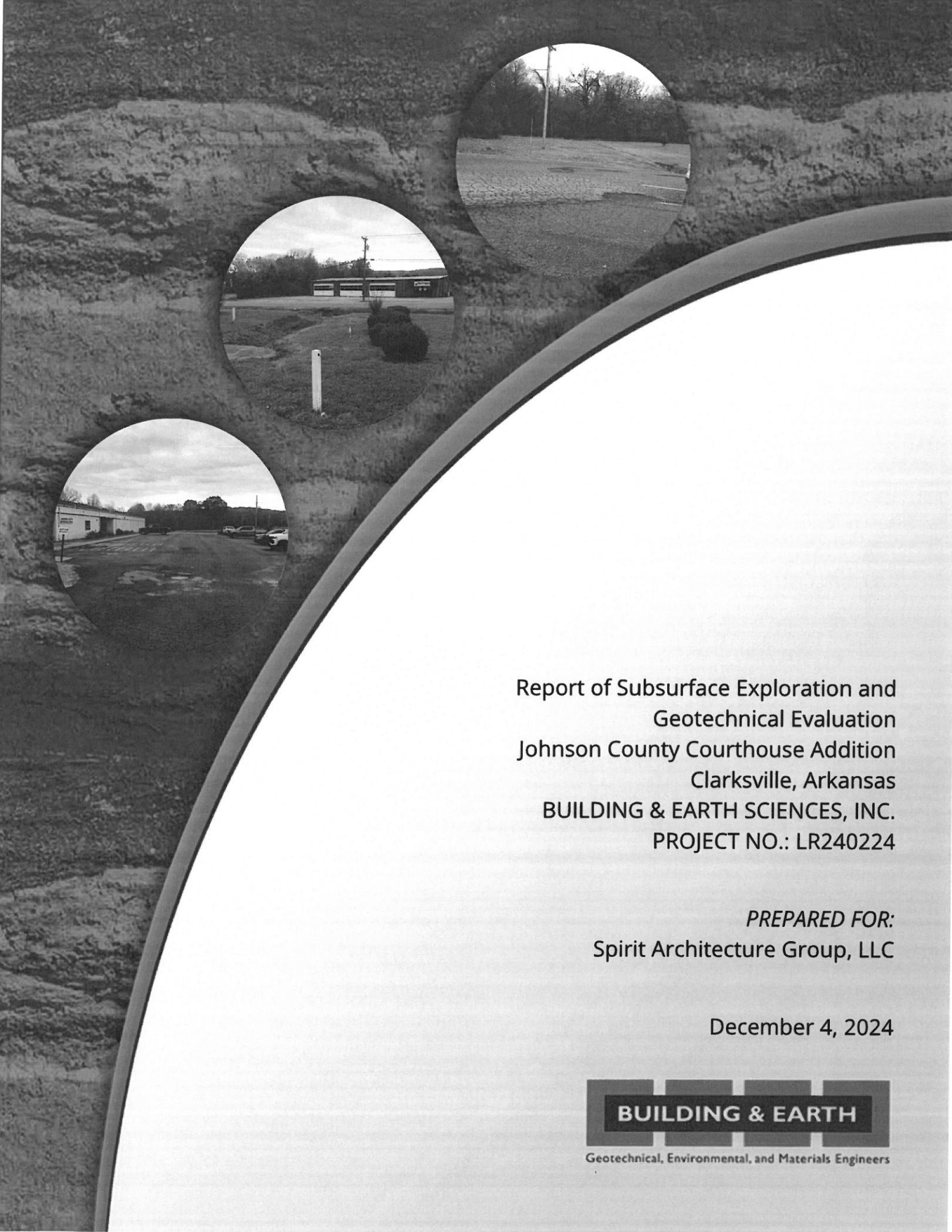
1. Each Bidder must determine "Working Conditions" at the site, and Bidder is totally responsible for his determination. Bidders are to visit the site of the work, to examine carefully local conditions, to inform themselves by their independent research, test, test holes, and investigation of the difficulties to be encountered above and below the ground surface and judge for themselves the accessibility of the work and all attending circumstances affecting the cost of doing the work and the time required for its completion.
2. For Bidder's INFORMATION ONLY and NOT as a substitute for Bidder's independent investigation, Owner has authorized a report from Building & Earth, North Little Rock, Arkansas, an independent professional soils laboratory, who performed a subsurface exploration at the project site to evaluate the engineering properties of the subsoils and soil parameters and made recommendations for site development and pavement design.
3. Report is bound in these Specifications.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION



Report of Subsurface Exploration and
Geotechnical Evaluation
Johnson County Courthouse Addition
Clarksville, Arkansas
BUILDING & EARTH SCIENCES, INC.
PROJECT NO.: LR240224

PREPARED FOR:
Spirit Architecture Group, LLC

December 4, 2024

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

December 4, 2024

Spirit Architecture Group, LLC
108 E. Mulberry Street
Collierville, Tennessee 38017

Attention: Mr. Mark Hammer, AIA
Vice-President/Justice

Subject: Subsurface Exploration and Geotechnical Evaluation
Johnson County Courthouse Addition
Clarksville, Arkansas
Building & Earth Sciences, Inc. Project No: LR240224

Dear Mr. Hammer:

Building & Earth Sciences, Inc. has completed the authorized subsurface exploration and geotechnical engineering evaluation for the Johnson County Courthouse Addition located at 301 Porter Industrial Road in Clarksville, Arkansas.


The purpose of this exploration and evaluation was to determine general subsurface conditions at the site and to address applicable geotechnical aspects of the proposed construction and site development. The recommendations in this report are based on a physical reconnaissance of the site and observation and classification of samples obtained from 6 soil test borings conducted at the site. Confirmation of the anticipated subsurface conditions during construction is an essential part of geotechnical services.

We appreciate the opportunity to provide consultation services for the proposed project. If you have any questions regarding the information in this report or need any additional information, please call us.

Respectfully Submitted,

Building & Earth Sciences, Inc.

AR Certificate of Authorization No. 569, Expiration Date 12/31/25


Stuart M. Scheiderer, P. E.
Branch Manager
AR 11424





Joseph D. Vistad, P.E.
Senior Engineering Review - Principal

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Key to Logs

Key to Hatches

Important Information about this Geotechnical-Engineering Report

1.0 PROJECT AND SITE DESCRIPTION

The subject site is located at 301 Porter Industrial Road, Clarksville, Arkansas. Information relative to the proposed site and the proposed development is listed in [Table 1](#) below. Photographs depicting the current site condition are presented on the following page.

Table 1: Project and Site Description

Detail	Description
General Site	
Size (Ac.)	±3.6
Existing Development	Two Structures, Paving
Vegetation	Mowed Grass, Shrubs
Slopes	No
Retaining Walls	No
Drainage	Surface Flow to Existing Drainage Features
Cuts & Fills	2.5 to 6.5 Feet of Fill Noted in Borings
Proposed Buildings	
No. of Bldgs	1 (One)
Square Ft.	4400
Stories	Single-Story
Construction	Wood Frame
Column Loads	50 kips (Assumed)
Wall Loads	2 klf (Assumed)
Preferred Foundation	Conventional Shallow Foundation
Preferred Slab	Slab-on-Grade
Pavements	
Traffic	Not Provided
Standard Duty	Rigid and Flexible
Heavy Duty	Rigid and Flexible

Reference: Request for Proposal - Spirit Architecture Group, LLC - 10/3/24

Notes:

- 1. If actual loading conditions exceed our assumed loads, Building & Earth Sciences, Inc. should be allowed to review the proposed structural design and its effects on our recommendations for foundation design.**
- 2. When a grading plan is developed, Building & Earth Sciences, Inc. should be allowed to review the plan and its effects on our recommendations.**

Site Photos



Parking Lot Between Building and Road



Green Space Between Parking Lot and Road



Rear Area Behind Existing Building

2.0 SCOPE OF SERVICES

The authorized subsurface exploration was performed on November 18 and 19, 2024 in conformance with our proposal LR26245, dated October 10, 2024. The proposal was signed and returned on November 8, 2024.

The purpose of the geotechnical exploration was to determine general subsurface conditions at specific boring locations and to gather data on which to base a geotechnical evaluation with respect to the proposed construction. The subsurface exploration for this project consisted of six (6) soil test borings. The site was drilled using a Geoprobe 7822DT equipped with an automatic hammer for performing Standard Penetration Tests (SPT) to help evaluate the relative soil strength. Refer to the [Geotechnical Investigation Methodologies Appendix](#) for a description of the drilling and sampling procedures.

The soil boring locations were determined in the field by a representative of our staff using Google Earth imagery. As such, the boring locations shown on the Boring Location Plan attached to this report should be considered approximate.

The results of the laboratory analysis are presented on the enclosed Boring Logs and in tabular form in the Appendix of this report. Descriptions of the laboratory tests that were performed are also included in the Laboratory Test Procedures Appendix.

The soil samples recovered during our site investigation were visually classified and specific samples were selected by the project engineer for laboratory analysis. The laboratory analysis consisted of:

Table 2: Scope of Laboratory Tests

Test	ASTM	No. of Tests
Natural Moisture Content	D2216	36
Atterberg Limits	D4318	3
Material Finer Than No. 200 Sieve by Washing	D1140	4

The information gathered from the exploration was evaluated to determine a suitable foundation type for the proposed structure. The information was also evaluated to help determine if any special subgrade preparation procedures will be required during the earthwork phase of the project.

The results of the work are presented within this report that addresses:

- Site geology and potential impact on site development.
- Summary of existing surface conditions.
- A description of the subsurface and groundwater conditions encountered at the boring locations. Long-term monitoring of groundwater was not included in our scope of work.
- Presentation of field and laboratory test results.
- Site preparation considerations including material types to be expected at the site and treatment of unsuitable soils, if encountered.
- Compaction requirements and recommended criteria to establish suitable material for structural backfill.
- Recommendations to be used for foundation design, including appropriate foundation types, bearing pressures, and depths.
- Recommendations for slab-on-grade design, including a modulus of subgrade reaction.
- Recommendations for suitable pavement sections based on assumed traffic information, including general recommendations for rigid and flexible pavement design.

3.0 GEOTECHNICAL SITE CHARACTERIZATION

The following discussion is intended to create a general understanding of the site from a geotechnical engineering perspective. It is not intended to be a discussion of every potential geotechnical issue that may arise, nor to provide every possible interpretation of the conditions identified. The following conditions and subsequent recommendations are based on the assumption that significant changes in subsurface conditions do not occur between boreholes. However, anomalous conditions can occur due to variations in existing fill present at the site, the geologic conditions at the site, and it will be necessary to evaluate the assumed conditions during site grading and foundation installation.

3.1 GEOLOGY -CENTRAL REGION

The Geologic Map of Arkansas, published by the Arkansas Geologic Commission in cooperation with the United States Geological Survey, indicates the site exists within the Arkansas Valley and Ouachita Mountain physiographic province of west-central Arkansas. More specifically, the area lies near the transition between the Savanna and McAlester formations. Both are described as consisting of massive shale beds with minor sandstone lenses and beds. Overburden soils are residual deposits of clays with variable amounts of shale fragments. The soils encountered are considered consistent with the general geology of the area.

3.2 EXISTING SURFACE CONDITIONS

The project is located at the Johnson County Sheriff's Office complex. Two larger structures exist with a parking lot on the south side of the buildings. The thickness of the pavement was estimated to be 1.5 to 2 inches thick in the areas investigated, with up to 4 inches of crushed stone. The proposed construction area is predominately located within the south parking area. A drive and parking area also extends on the west side of the structures and continues to the rear. The area between the parking lot and Porter Industrial Road is covered with maintained grass and shrubs. A drainage swale/ditch exists in a portion of the green area.

3.3 SUBSURFACE CONDITIONS

A generalized stratification summary has been prepared using data from the soil test borings and is presented in the table below. The stratification depicts the general soil conditions and strata types encountered during our field investigation.

Table 3: Stratification Summary

Stratum No.	Description	Consistency/Relative Density
1	Existing Fill - Lean Clay (CL) with varied amounts of sand	Soft to Very Stiff
2	Residual Clay - Lean Clay (CL)	Very Soft to Hard
3	Weathered Shale	Soft to Moderately Hard

Subsurface soil profiles which show the thickness of the stratum referenced above have also been prepared based on the data obtained at the specific boring locations. The subsurface soil profiles are presented in the Subsurface Soil Profiles Appendix. For specific details on the information obtained from individual soil borings, please refer to the Boring Logs included in the Boring Logs Appendix. The elevations of the borings indicated in this report were estimated based on data obtained from Google Earth.

3.3.1 SOIL TYPE 1 - EXISTING FILL

Materials considered to be fill were encountered beneath the existing pavements and aggregate base. Atterberg limit tests performed determined the soils have an average liquid limit of 34 and an average plasticity index of 17. The materials were found to contain between 50% and 71% fines (passing the No. 200 sieve), resulting in a classification of lean clay (CL) with sand or sandy lean clay (CL). The N-values were mostly below 6, classifying as soft to medium stiff in most cases. The natural moisture content exceeded 19.9% in most cases. The existing fill extended to depths ranging from 2.5 to 6.5 feet below existing grades.

3.3.2 SOIL TYPE 2 - RESIDUAL CLAY

Natural residual clays were present beneath the existing fill and transitioned to weathered shale at 8.5 to 9.5 feet below existing grades. The PI of these materials was found to be 23 in the representative sample tested, with 59% fines. Similar N-values were obtained in these materials and extended to depths of 6.5 feet in borings B-02, B-04 and B-05. Firmer soils were encountered within 5 feet of the surface at borings B-03 and B-06. The natural moisture content was highly variable ranging from 9.5% to 21.7% and correlated with N-values. Soils with higher moisture contents typically have corresponding lower N-values.

3.3.3 SOIL TYPE 3 - WEATHERED SHALE

Weathered shale was encountered at an average depth of 9.0 feet below existing grades in the areas explored, as summarized in the table below. The degree of weathering generally decreased with depth. The N-values exceeded 50 blows per foot, mostly less than 6 inches or less of penetration for 50 blows. The weathered shale was considered to be soft to moderately hard based on the N-values.

Table 4: Depth to Weathered Shale

Boring No.	Depth (ft)	Boring No.	Depth (ft)
B-01	8.5	B-04	9.0
B-02	9.0	B-05	9.5
B-03	9.0	B-06	9.0

3.3.4 GROUNDWATER

At the time of drilling, groundwater was not encountered in the boreholes. Water levels reported are accurate only for the time and date that the borings were drilled. Long term monitoring of the boreholes was not included as part of our subsurface exploration. The borings were backfilled the same day they were drilled. Groundwater data is included in the following table.

3.4 SEISMIC SITE CLASSIFICATION

Table 5: Seismic Site Classification

Basis of Evaluation	Recommended Site Classification
2015 International Building Code (IBC) and ASCE 7, Chapter 20	C
This recommended seismic site classification is based on the 2015 Edition of the International Building Code, the subsurface conditions encountered in the borings, and our knowledge of the geologic conditions of the site. Our subsurface exploration extended to a maximum depth of about 20 feet; hence the seismic site classification should be re-evaluated in the event subsurface information is made available to a depth of 100 feet.	

4.0 SITE DEVELOPMENT CONSIDERATIONS

A grading plan was not available at the time of this report. Based on visual observations, we anticipate up 2 feet of fill will be required to reach finished grades. ***Once a grading plan is developed, Building & Earth Sciences, Inc. should be allowed to review the plan and its effects on our recommendations.***

Based on our evaluation of the subsurface soil information, and the anticipated foundation loads, it appears that construction with a Conventional Shallow Foundation system is feasible. The site development recommendations outlined below are intended for development of the site to support construction with a Conventional Shallow Foundation system. ***If a different type of foundation system is preferred, Building & Earth Sciences, Inc. should be allowed to review the site development recommendations to verify that they are appropriate for the preferred foundation system.***

The primary geotechnical concerns for this project are:

- The presence of existing structures on the site. Buried structures and deleterious materials could be encountered.
- The presence of undocumented existing fill material in all borings.
- Low consistency (N-value ≤ 6) fill and residual clay soils identified in most borings.
- Moisture sensitive soils encountered throughout the site.
- Perched water could be encountered during construction which may require dewatering efforts, particularly adjacent to the existing structure, beneath pavements and within existing fill.

Recommendations addressing the site conditions are presented in the following sections.

4.1 INITIAL SITE PREPARATION

The existing pavements should remain as long as possible during construction to limit further deterioration of the underlying soils. Vegetation, roots, topsoil and deleterious materials should be removed from the proposed construction areas where present. As the borings were located in pavement areas, topsoil is estimated to be on the order of 6 inches. A geotechnical engineer or a representative should evaluate the subgrade once pavements are removed within the proposed building footprint. Additionally, clearing and grubbing should be performed in areas outside pavements to ensure that all unsuitable materials are removed from locations for proposed construction.

Because of past use of the site, buried structures could be encountered, such as foundations, utility lines, septic tanks, etc. If encountered, they should be removed and backfilled in accordance with requirements outlined in the Structural Fill section of this report.

Materials disturbed during clearing operations should be stabilized in place or, if necessary, undercut to undisturbed materials and backfilled with properly compacted, approved structural fill.

During site preparation activities, the contractor should identify borrow source materials that will be used as structural fill and provide samples to the testing laboratory so that conformance to the Structural Fill requirements outlined below and appropriate moisture-density relationship curves can be determined.

4.2 SUBGRADE EVALUATION

We recommend that the project geotechnical engineer or a qualified representative evaluate the subgrade after the site is prepared. Some unsuitable or unstable areas may be present in unexplored areas of the site. All areas that will require fill or that will support structures should be carefully proofrolled with a heavy (40,000 # minimum), rubber-tired vehicle at the following times.

- After an area has been stripped, and undercut if required, prior to the placement of any fill.
- After grading an area to the finished subgrade elevation in a building or pavement area.
- After areas have been exposed to any precipitation, and/or have been exposed for more than 48 hours.

Some instability may exist during construction, depending on climatic and other factors immediately preceding and during construction. If any soft or otherwise unsuitable soils are identified during the proofrolling process, they must be undercut or stabilized prior to fill placement, pavement construction, or floor slab construction. All unsuitable material identified during the construction shall be removed and replaced in accordance with the Structural Fill section of this report.

4.3 MOISTURE SENSITIVE SOILS

Moisture sensitive clays, both fill and natural, were encountered across most of the site during the subsurface exploration. These soils will degrade if allowed to become saturated. Therefore, not allowing water to pond by maintaining positive drainage and temporary dewatering methods (if required) is important to help avoid degradation and softening of the soils.

The contractor should anticipate some difficulty during the earthwork phase of this project if moisture levels are moderate to high during construction. Increased moisture levels will soften the subgrade and the soils may become unstable under the influence of construction traffic. Accordingly, construction during wet weather conditions should be avoided, as this could result in soft and unstable soil conditions that would require ground modification, such as in place stabilization or undercutting.

4.4 UNDERCUTTING OF LOW CONSISTENCY SOILS

Low consistency soils ($N \leq 6$) were encountered most borings with the exception of B-01. Low consistency soils should be undercut to a stable, suitable subgrade within the footprint of the structure. The undercutting should extend laterally 5 feet outside the building footprint. Undercut depths of 5 to 6.5 feet should be expected based on data obtained from the borings.

Though specific information was not provided, recommendations for pavements were requested. In the planned pavement areas, the low-consistency soils should be removed in order to reach the planned subgrade elevation or the undercutting should extend laterally 3 feet outside of the edge of pavement. More specific information can be provided once a final grading plan is determined. It may be possible to stabilize the soft soils in the pavement areas in place. Typical stabilization methods vary widely and can include utilization of geogrids and graded aggregates. The design of a specific stabilization method is beyond the scope of this investigation but can be provided by Building & Earth Sciences, Inc. as an additional service if desired. Any undercutting or stabilization performed in pavement areas should be conducted under the observation of the geotechnical engineer or a designated representative.

Some unsuitable or unstable areas may be present in unexplored areas of the site. Once the known undercut is complete, the areas planned for construction should be proofrolled in order to identify any additional soft soils requiring removal.

Undercut soils should be replaced with structural fill. Clean, non-organic, non-saturated soils taken from the undercut area can be re-used as structural fill. The placement procedure, compaction and composition of the structural fill must meet the requirements of the Structural Fill section of this report.

The undercutting should be conducted under the observation of the geotechnical engineer or a designated representative. *Weather conditions at the time of construction will affect the undercutting depths and quantities.* Some instability may exist during construction, depending on climatic and other factors immediately preceding and during construction.

4.5 STRUCTURAL FILL

Requirements for structural fill on this project are as follows:

Table 6: Structural Fill Requirements

Soil Type	USCS Classification	Property Requirements	Placement Location
Sand and Gravel	GW, GP, GM, SW, SP, SM or combinations	Maximum 2" particle size	All locations and depths with proper drainage.
Clay	CL, SC, GC	LL<50, PI<25, γ_d >100 pcf	All locations and depths.
Clay	CH	LL>50, PI>25, γ_d <100 pcf	Not suitable as structural fill.
Silt	ML, MH	N/A	Not suitable as structural fill.
On-site soils	CL	As listed above	All locations and depths.

Notes:

1. All structural fill should be free of vegetation, topsoil, and any other deleterious materials. The organic content of materials to be used for fill should be less than 3 percent unless approved by the geotechnical engineer.
2. LL indicates the soil Liquid Limit; PI indicates the soil Plasticity Index; γ_d indicates the maximum dry density as defined by the density standard outlined in the table below.
3. Laboratory testing of the soils proposed for fill must be performed in order to verify their conformance with the above recommendations.
4. Any fill to be placed at the site should be reviewed by the geotechnical engineer.

Placement requirements for structural fill are as follows:

Table 7: Structural Fill Placement Requirements

Specification	Requirement
Lift Thickness	Maximum 8-inch loose lifts when compacted with large heavy compaction equipment. Maximum 6-inch loose lifts when compacted with lightweight compaction equipment. (thinner lifts may be required in confined locations).
Density	Minimum of 98 percent of maximum dry density as defined by ASTM D698 at all locations and depths.
Moisture	±2 percent of optimum moisture as defined by ASTM D698 for cohesive soils. For cohesionless soils with greater than 12 percent passing the US Standard No. 200 sieve, ±3 percent of optimum moisture as defined above. Moisture requirement is waived for cohesionless soil with less than 12 percent passing the No. 200 sieve.
Density Testing Frequency	One test per 2,500 sf in building areas and one test per 5,000 sf in pavement areas with minimum of 3 tests per lift. One test per 200 feet of trench backfill with minimum of 2 tests per lift. The testing frequency can be increased or decreased by the Geotechnical Engineer of Record in the field based on uniformity of material being placed and compactive effort used.

4.6 EXCAVATION CONSIDERATIONS

All excavations performed at the site should follow OSHA guidelines for temporary excavations. Excavated soils should be stockpiled according to OSHA regulations to limit the potential cave-in of soils.

4.6.1 DIFFICULT EXCAVATION

Weathered shale was encountered between 8.5 and 9.5 feet below existing grades. Though this depth will likely be beyond excavation depths typically required, deeper utilities or possible pits may require deeper excavations. Larger track mounted excavators will likely be required to efficiently penetrate the weathered shale.

The depth that weathered rock and rock can be excavated is a function of the material, the equipment used, the skill of the operator, the desired rate of removal and other factors. Large earthmoving equipment can typically rip weathered rock that can be excavated with a track hoe, however, the contractor should review the site conditions and determine the excavation techniques needed. If more detailed information is desired as to the rippability of the weathered rock, Building & Earth Sciences, Inc. can provide a proposal to perform a Seismic Refraction Study to determine Seismic Wave Velocities in the rock.

4.6.2 GROUNDWATER

Groundwater was not encountered over the depths and areas investigated. Groundwater could be encountered during construction, particularly during undercutting operations.

It should be noted that fluctuations in the water level could occur due to seasonal variations in rainfall. The contractor must be prepared to remove groundwater seepage from excavations if encountered during construction. Excavations extending below groundwater levels will require dewatering systems (such as well points, sump pumps or trench drains). The contractor should evaluate the most economical and practical dewatering method.

4.7 UTILITY TRENCH BACKFILL

All utility trenches must be backfilled and compacted in the manner specified above for structural fill. It may be necessary to reduce the lift thickness to 4 to 6 inches to achieve compaction using hand-operated equipment.

4.8 LANDSCAPING AND DRAINAGE CONSIDERATION

The potential for soil moisture fluctuations within building areas and pavement subgrades should be reduced to lessen the potential of subgrade movement. Site grading should include positive drainage away from buildings and pavements. Excessive irrigation of landscaping poses a risk of saturating and softening soils below shallow footings and pavements, which could result in settlement of footings and premature failure of pavements.

4.9 WET WEATHER CONSTRUCTION

Excessive movement of construction equipment across the site during wet weather may result in ruts, which will collect rainwater, prolonging the time required to dry the subgrade soils.

During rainy periods, additional effort will be required to properly prepare the site and establish/maintain an acceptable subgrade. The difficulty will increase in areas where clay or silty soils are exposed at the subgrade elevation. Grading contractors typically postpone grading operations during wet weather to wait for conditions that are more favorable. Contractors can typically disk or aerate the upper soils to promote drying during intermittent periods of favorable weather.

When deadlines restrict postponement of grading operations, additional measures such as undercutting and replacing saturated soils or stabilization can be utilized to facilitate placement of additional fill material.

5.0 FOUNDATION RECOMMENDATIONS

Specific structural loading conditions were not known at the time of this report; however, based on our experience with similar projects, we anticipate that the individual column loads will be less than 50 kips and wall loads will be less than 2 kips per linear foot. ***If these assumptions concerning structural loading are incorrect, our office should be contacted, such that our recommendations can be reviewed.***

Based on the conditions encountered during our field investigation and after our site preparation and grading recommendations are implemented, the proposed structure can be supported on conventional shallow foundations designed using an allowable soil bearing capacity of 2000 psf.

Even though computed footing dimensions may be less, column footings should be at least 24 inches wide and strip footings should be at least 18 inches wide. These dimensions facilitate hand cleaning of footing subgrades disturbed by the excavation process and the placement of reinforcing steel. They also reduce the potential for localized punching shear failure. ***All exterior footings should bear at least 18 inches below the adjacent exterior grade.*** Total settlement of footings designed and constructed as recommended above should be 1 inch or less.

The following items should be considered during the preparation of construction documents and foundation installation:

- The geotechnical engineer of record should observe the exposed foundation bearing surfaces prior to concrete placement to verify that the conditions anticipated during the subsurface exploration are encountered.
- All bearing surfaces must be free of soft or loose soil prior to placing concrete.
- Concrete should be placed the same day the excavations are completed and bearing materials verified by the engineer. If the excavations are left open for an extended period, or if the bearing surfaces are disturbed after the initial observation, then the bearing surfaces should be reevaluated prior to concrete placement.

- Water should not be allowed to pond in foundation excavations prior to concrete placement or above the concrete after the foundation is completed.
- Wherever possible, the foundation concrete should be placed “neat”, using the sides of the excavations as forms. Where this is not possible, the excavations created by forming the foundations must be backfilled with suitable structural fill and properly compacted.
- The site should be sloped to drain away from the building foundations.
- Roof drains should be routed away from the foundation soils.

6.0 FLOOR SLABS

Site development recommendations presented in this report should be followed to provide for subgrade conditions suitable for support of grade supported slabs. Floor slabs will be supported on properly compacted Structural Fill.

We recommend floor slabs for the proposed structure be supported on a minimum four-inch layer of clean, densely-graded granular material commonly referred to as “crusher-run” materials. Alternatively, DOT approved road base with 100% passing the 1-1/2 in sieve, 15% to 55% passing the No. 4 sieve and less than 12% passing the No 200 sieve may be used. The material passing the #200 sieve should be clean, granular fill with less than 3% clay or friable particles. The purpose of this layer is to help provide a uniform loading condition and act as a capillary break for moisture migration through the subgrade soil. This gravel material should be consolidated in-place with vibratory equipment. A modulus of subgrade reaction of 125 pci can be used in the design of a grade-supported building floor slab.

We recommend a minimum 10-mil thick vapor retarder meeting ASTM E 1745, Class C requirements be placed directly below the slab-on-grade floors. A higher quality vapor retarder (Class A or B) may be used if desired to further inhibit the migration of moisture through the slab-on-grade and should be evaluated based on the floor covering and use. The vapor retarder should extend to the edge of the slab-on-grade floors and should be sealed at all seams and penetrations. The slab should be appropriately reinforced (if required) to support the proposed loads.

Where applicable, we recommend that the floor slab be isolated from the foundation footings so differential settlement of the structure will not induce shear stresses on the floor slab. Temperature and shrinkage reinforcements in slabs on grade maybe considered and incorporated accordingly in the slab design. ACI 360R-10 provides guidance on the proper quantity of such reinforcement. The slab should also be appropriately reinforced to support the proposed loads as required.

If welded-wire mesh reinforcement is utilized, the mesh reinforcement should be placed 2 inches below the slab surface or upper one-third of the slab thickness, whichever is closer to the surface. Adequate construction joints, contraction joints and isolation joints should also be provided in the slab to reduce the impacts of cracking and shrinkage, in general accordance with ACI standards and guidelines (ACI 360R-10).

7.0 PAVEMENT CONSIDERATIONS

Based on the materials encountered at the boring locations and after our recommendations for site preparation are implemented, pavements at the subject site may be designed based on a California Bearing Ratio (CBR) of five (5). Variable amounts of undercut will likely be required to provide a minimum of 12 inches of properly compacted Structural Fill beneath the planned pavement sections. Note that no CBR or plate load testing was completed to develop these recommendations. For pavement design purposes, we have assumed two levels of traffic for commonly used pavement sections. Specific traffic information was not provided.

It has been our experience that parking lots experience a certain level of wear and stress greater than roadways designed for similar traffic volumes. Therefore, parking lots are typically designed using the AASHTO method and adjusted based on experience. If the owner would like Building & Earth Sciences, Inc. to assess other likely traffic volumes, we will gladly review other options.

In addition, we have assumed the following design parameters:

Table 8: Assumed Design Parameters

Design Criteria	Value
Design life (Years)	20
Terminal Serviceability	2.0
Reliability	85%
Initial Serviceability	4.2
Standard Deviation	0.45 (Flexible)
Standard Deviation	0.35 (Rigid)

All base and pavement construction operations should meet minimum requirements of the Arkansas Department of Transportation (ArDOT) Standard Specifications for Highway Construction, 2014 Edition. The applicable sections of the specifications are identified as follows:

Table 9: DOT Specification Sections

Material	Specification Section
Portland Cement Concrete Pavement	501
Bituminous Asphalt Wearing Layer	407
Mineral Aggregate Base Materials	303

7.1 FLEXIBLE PAVEMENT

The asphalt pavement sections described herein were designed using the “AASHTO Guide for Design of Pavement Structures, 1993”. Alternative pavement sections were designed by establishing the structural numbers used for the AASHTO design system and substituting materials based upon structural equivalency as follows:

Table 10: Structural Equivalent Coefficient

Material	Structural No.
Asphalt Concrete	0.44
Crushed Stone Base	0.14

The following flexible pavement sections are based on the design parameters presented above:

Table 11: Asphalt Pavement Recommendations

Minimum Recommended Thickness (in)		Material
Standard Duty	Heavy Duty	
2	3	Surface Course
6	6	Base

7.2 RIGID PAVEMENT

The following rigid pavement sections are based on the design parameters presented above. We assume an effective modulus of subgrade reaction (k) of 125 pci. We have assumed concrete elastic modulus (E_c) of 3.6×10^6 psi, and a concrete modulus of rupture (S'_c) of 650 psi.

Table 12: Rigid Pavement Recommendations

Minimum Recommended Thickness (in)		Material
Standard Duty	Heavy Duty	
5	6	Portland Cement Concrete, $f'_c=4000$ psi
4	4	Base

The concrete should be protected against moisture loss, rapid temperature fluctuations, and construction traffic for several days after placement. All pavements should be sloped for positive drainage. We recommend the pavements be reinforced to hold any cracks that might develop tightly together and restrain their growth.

All pavement components must be placed and compacted in accordance with the applicable sections of the Arkansas Department of Transportation (ArDOT) Standard Specifications for Highway Construction, 2014 Edition. All base and pavement construction operations should meet minimum requirements of the Arkansas Department of Transportation (ArDOT) Standard Specifications for Highway Construction, 2014 Edition.

8.0 SUBGRADE REHABILITATION

The subgrade soils often become disturbed during the period between initial site grading and construction of surface improvements. The amount and depth of disturbance will vary with soil type, weather conditions, construction traffic, and drainage.

The engineer should evaluate the subgrade soil during final grading to verify that the subgrade is suitable to receive pavement and/or concrete slab base materials. The final evaluation may include proofrolling or density tests.

Subgrade rehabilitation can become a point of controversy when different contractors are responsible for site grading and building construction. The construction documents should specifically state which contractor will be responsible for maintaining and rehabilitating the subgrade. Rehabilitation may include moisture conditioning and re-compacting soils. When deadlines or weather restrict grading operations, additional measures such as undercutting and replacing saturated soils or chemical stabilization can often be utilized.

9.0 CONSTRUCTION MONITORING

Field verification of site conditions is an essential part of the services provided by the geotechnical consultant. In order to confirm our recommendations, it will be necessary for Building & Earth Sciences, Inc. personnel to make periodic visits to the site during site grading. Typical construction monitoring services are listed below.

- Periodic observation and consultation by a member of our engineering staff during site development.
- Continuous monitoring during structural fill placement.

- Field density testing during structural fill placement.
- Observation and verification of the bearing surfaces exposed after foundation excavation.
- Molding and testing of concrete cylinders.
- Structural steel inspections.
- Sampling of asphalt for verification and coring for determination of in-place density and thickness.

10.0 CLOSING AND LIMITATIONS

This report was prepared for Spirit Architecture Group, LLC, for specific application to the Johnson County Courthouse Addition located in Clarksville, Arkansas. The information in this report is not transferable. This report should not be used for a different development on the same property without first being evaluated by the engineer.

The recommendations in this report were based on the information obtained from our field exploration and laboratory analysis. The data collected is representative of the locations tested. Variations are likely to occur at other locations throughout the site. Engineering judgment was applied in regards to conditions between borings. It will be necessary to confirm the anticipated subsurface conditions during construction.

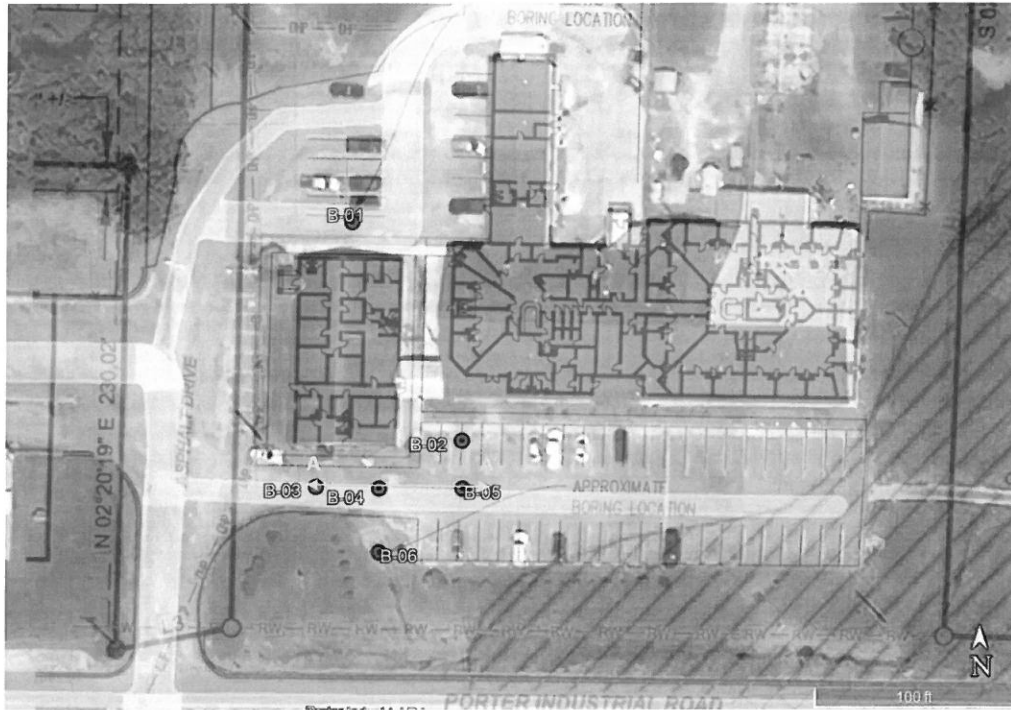
This report has been prepared in accordance with generally accepted standards of geotechnical engineering practice. No other warranty is expressed or implied. In the event that changes are made, or anticipated to be made, to the nature, design, or location of the project as outlined in this report, Building & Earth Sciences, Inc. must be informed of the changes and given the opportunity to either verify or modify the conclusions of this report in writing, or the recommendations of this report will no longer be valid.

The scope of services for this project did not include any environmental assessment of the site or identification of pollutants or hazardous materials or conditions. If the owner is concerned about environmental issues Building & Earth Sciences, Inc. would be happy to provide an additional scope of services to address those concerns.

This report is intended for use during design and preparation of specifications and may not address all conditions at the site during construction. Contractors reviewing this information should acknowledge that this document is for design information only.

An article published by the Geoprofessional Business Association (GBA), titled *Important Information About Your Geotechnical Report*, has been included in the Supporting Documentation Appendix. We encourage all individuals to become familiar with the article to help manage risk.

A-1
BORING LOCATION PLAN



REFERENCE USED TO PRODUCE THIS DRAWING:

Google Earth Satellite Imagery dated 08/21/24 with overlay of Site Plan from Spirit Architecture Group, LLC, dated 10/3/24

BORING LOCATION PLAN

DATE: 11/19/2024

PROJECT NO.

LR240224

PROJECT NAME / LOCATION:

Johnson County Courthouse Addition
Clarksville, Arkansas

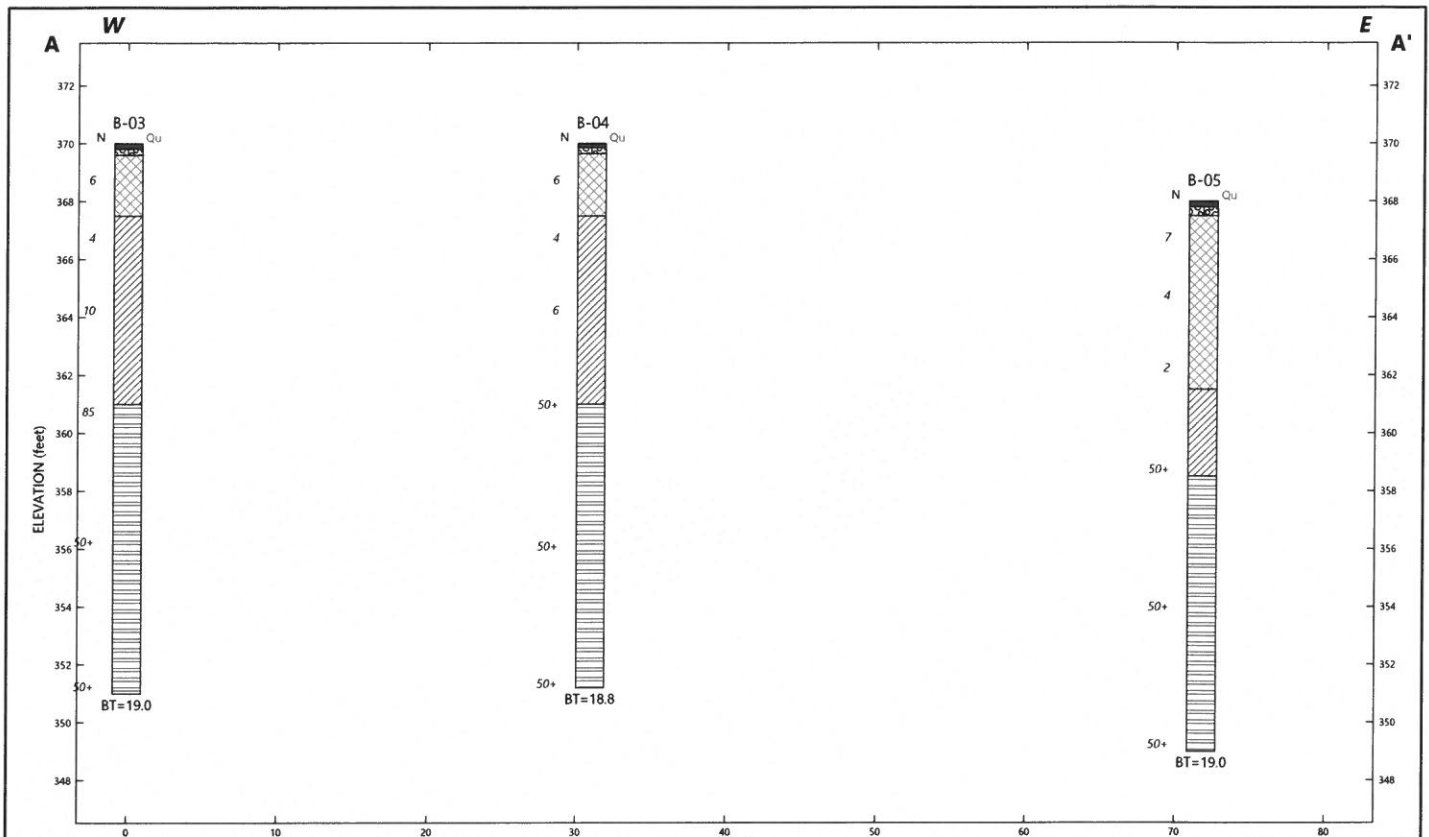
SCALE:

As Shown



Geotechnical, Environmental, and Materials Engineers

A-2
SUBSURFACE SOIL PROFILES



Site Map Scale 1 inch equals 60 feet

Key to Hatches

	Asphalt		Aggregate Base Material		Fill
	USCS Low Plasticity Clay		Shale		

Legend

BT=Boring Termination, TPT=Test Pit Terminated
AR=Auger Refusal, ER=Excavation Refusal
N=Standard Penetration Test N-Value
Qu=Unconfined compressive strength estimate from pocket penetrometer test (tsf)
 Water Level Reading at time of drilling.
 Water Level Reading after drilling.

Horizontal Scale (feet)

Vertical Exaggeration: 2x

Building & Earth Sciences, Inc.
29 Collins Industrial Place, Bldg. 1, Ste. C, North Little Rock, Arkansas 72113

Johnson County Courthouse Addition
Clarksville, Arkansas

A-A': Subsurface Profile

PROJECT NO: LR240224 PLATE NO: DATE: 12/3/24

BUILDING & EARTH

Geotechnical, Environmental, and Materials Engineers

A-3
BORING LOG DESCRIPTION

Building & Earth Sciences, Inc. used the gINT software program to prepare the attached boring logs. The gINT program provides the flexibility to custom design the boring logs to include the pertinent information from the subsurface exploration and results of our laboratory analysis. The soil and laboratory information included on our logs is summarized below:

DEPTH AND ELEVATION

The depth below the ground surface and the corresponding elevation are shown in the first two columns.

SAMPLE TYPE

The method used to collect the sample is shown. The typical sampling methods include Split Spoon Sampling, Shelby Tube Sampling, Grab Samples, and Rock Core. A key is provided at the bottom of the log showing the graphic symbol for each sample type.

SAMPLE NUMBER

Each sample collected is numbered sequentially.

BLOWS PER INCREMENT, REC%, RQD%

When Standard Split Spoon sampling is used, the blows required to drive the sampler each 6-inch increment are recorded and shown in column 5. When rock core is obtained the recovery ration (REC%) and Rock Quality Designation (RQD%) is recorded.

SOIL DATA

Column 6 is a graphic representation of four different soil parameters. Each of the parameters use the same graph, however, the values of the graph subdivisions vary with each parameter. Each parameter presented on column 6 is summarized below:

- N-value - The Standard Penetration Test N-value, obtained by adding the number of blows required to drive the sampler the final 12 inches, is recorded. The graph labels range from 0 to 50.
- Qu - Unconfined Compressive Strength estimate from the Pocket Penetrometer test in tons per square foot (tsf). The graph labels range from 0 to 5 tsf.

- **Atterberg Limits** – The Atterberg Limits are plotted with the Plastic Limit to the left, and Liquid Limit to the right, connected by a horizontal line. The difference in the Plastic and Liquid Limits is referred to as the Plasticity Index. The Atterberg Limits test results are also included in the Remarks column on the far right of the boring log. The Atterberg Limits graph labels range from 0 to 100%.
- **Moisture** – The Natural Moisture Content of the soil sample as determined in our laboratory.

SOIL DESCRIPTION

The soil description prepared in accordance with ASTM D2488, Visual Description of Soil Samples. The Munsel Color chart is used to determine the soil color. Strata changes are indicated by a solid line, with the depth of the change indicated on the left side of the line and the elevation of the change indicated on the right side of the line. If subtle changes within a soil type occur, a broken line is used. The Boring Termination or Auger Refusal depth is shown as a solid line at the bottom of the boring.

GRAPHIC

The graphic representation of the soil type is shown. The graphic used for each soil type is related to the Unified Soil Classification chart. A chart showing the graphic associated with each soil classification in the Soil Classification Methodology section of this Appendix.

REMARKS

Remarks regarding borehole observations, and additional information regarding the laboratory results and groundwater observations.

A-4
BORING LOGS



Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: B-01

Sheet 1 of 1

29 Collins Industrial Place, Bldg. 1, Ste. C
 North Little Rock, Arkansas 72113
 Office: (501) 504-6929
sscheiderer@buildingandearth.com

PROJECT NAME: Johnson County Courthouse Addition
 PROJECT NUMBER: LR240224
 DRILLING METHOD: Hollow Stem Auger
 EQUIPMENT USED: Geoprobe 7822DT
 HAMMER TYPE: Automatic
 BORING LOCATION: 35.456096°,-93.458914°

LOCATION: Clarksville, Arkansas
 DATE DRILLED: 11/18/24
 WEATHER: Cloudy/Rain
 ELEVATION: 371
 DRILL CREW: Building & Earth
 LOGGED BY: J. St. Pierre

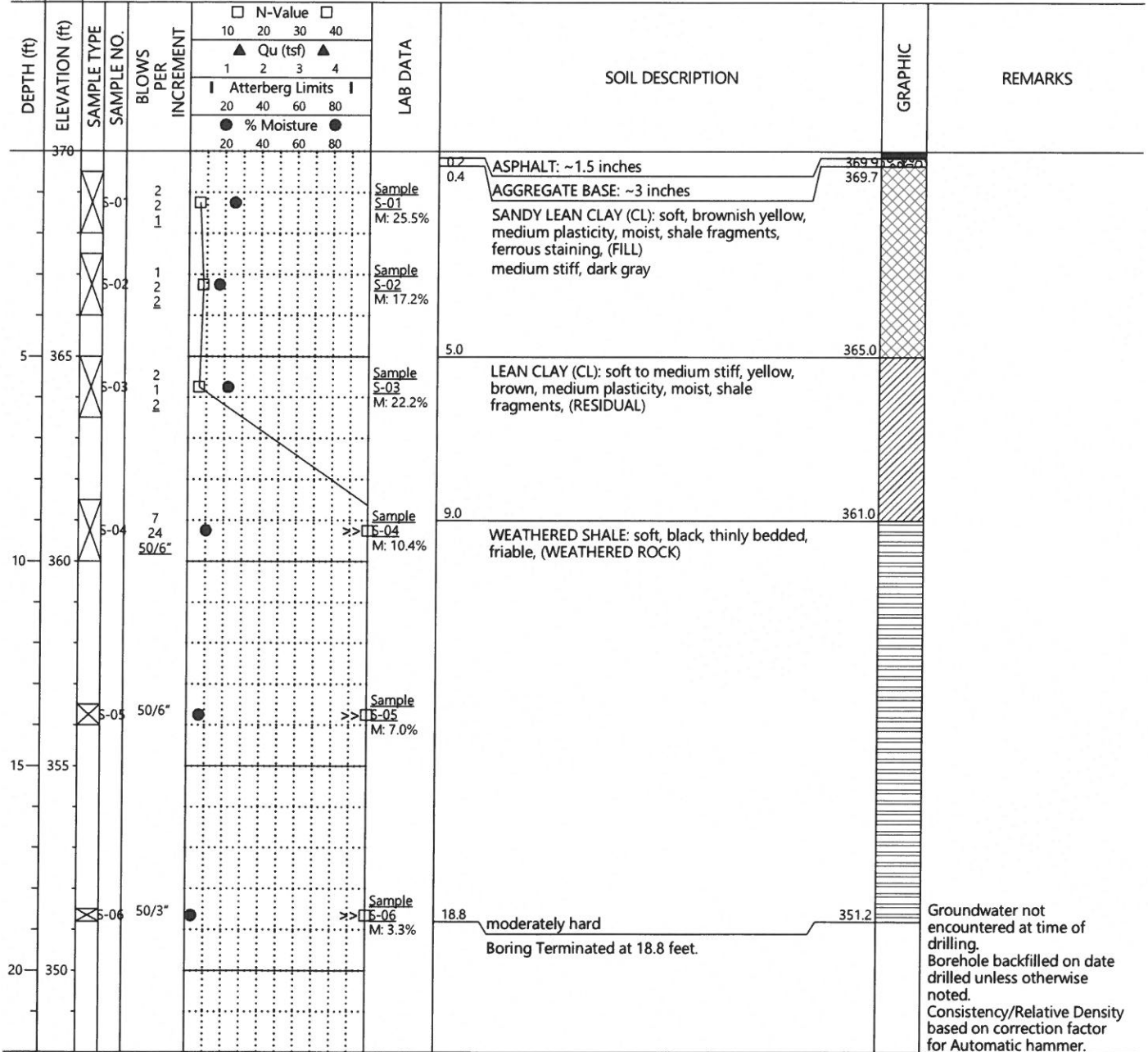
DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	BLOWS PER INCREMENT	LAB DATA				SOIL DESCRIPTION	GRAPHIC	REMARKS
					□ N-Value	□ Qu (tsf)	Atterberg Limits				
					10 20 30 40	1 2 3 4	20 40 60 80				
370	370.8	5-0		3				Sample S-01 LL: 36 PL: 18 PI: 18 M: 22.9% F: 71.1%	0.2 ASPHALT: ~2 inches 0.4 AGGREGATE BASE: ~4 inches		
365	370.6	5-02		3				Sample S-02 M: 25.5%	LEAN CLAY (CL) WITH SAND: stiff, brownish yellow, brown, low plasticity, moist, shale fragments, ferrous staining, (FILL) very stiff		
5	366.0	5-03		6				Sample S-03 M: 15.6%	LEAN CLAY (CL): hard, yellow, brown, medium plasticity, moist, shale fragments, (RESIDUAL)		
10	362.5	5-04		50/6"				Sample S-04 M: 9.5%	WEATHERED SHALE: soft, dark gray, thinly bedded, friable, (WEATHERED ROCK)		
15	355	5-05		50/2"				Sample S-05 M: 3.4%	moderately hard		
20	352.2	5-06		50/3"				Sample S-06 M: 3.0%	Boring Terminated at 18.8 feet.		Groundwater not encountered at time of drilling. Borehole backfilled on date drilled unless otherwise noted. Consistency/Relative Density based on correction factor for Automatic hammer.

SAMPLE TYPE Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206) **REC** RECOVERY **LL:** LIQUID LIMIT **M:** NATURAL MOISTURE CONTENT
% MOISTURE STANDARD NATURAL MOISTURE CONTENT **RQD** ROCK QUALITY DESIGNATION **PL:** PLASTIC LIMIT **F:** PERCENT PASSING NO. 200 SIEVE
 GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING **UD** UNDISTURBED **PI:** PLASTICITY INDEX
 STABILIZED GROUNDWATER LEVEL **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

PROJECT NAME: Johnson County Courthouse Addition
PROJECT NUMBER: LR240224
DRILLING METHOD: Hollow Stem Auger
EQUIPMENT USED: Geoprobe 7822DT
HAMMER TYPE: Automatic
BORING LOCATION: 35.455804°, -93.458732°

LOCATION: Clarksville, Arkansas
DATE DRILLED: 11/18/24
WEATHER: Cloudy/Rain
ELEVATION: 370
DRILL CREW: Building & Earth
LOGGED BY: J. St. Pierre

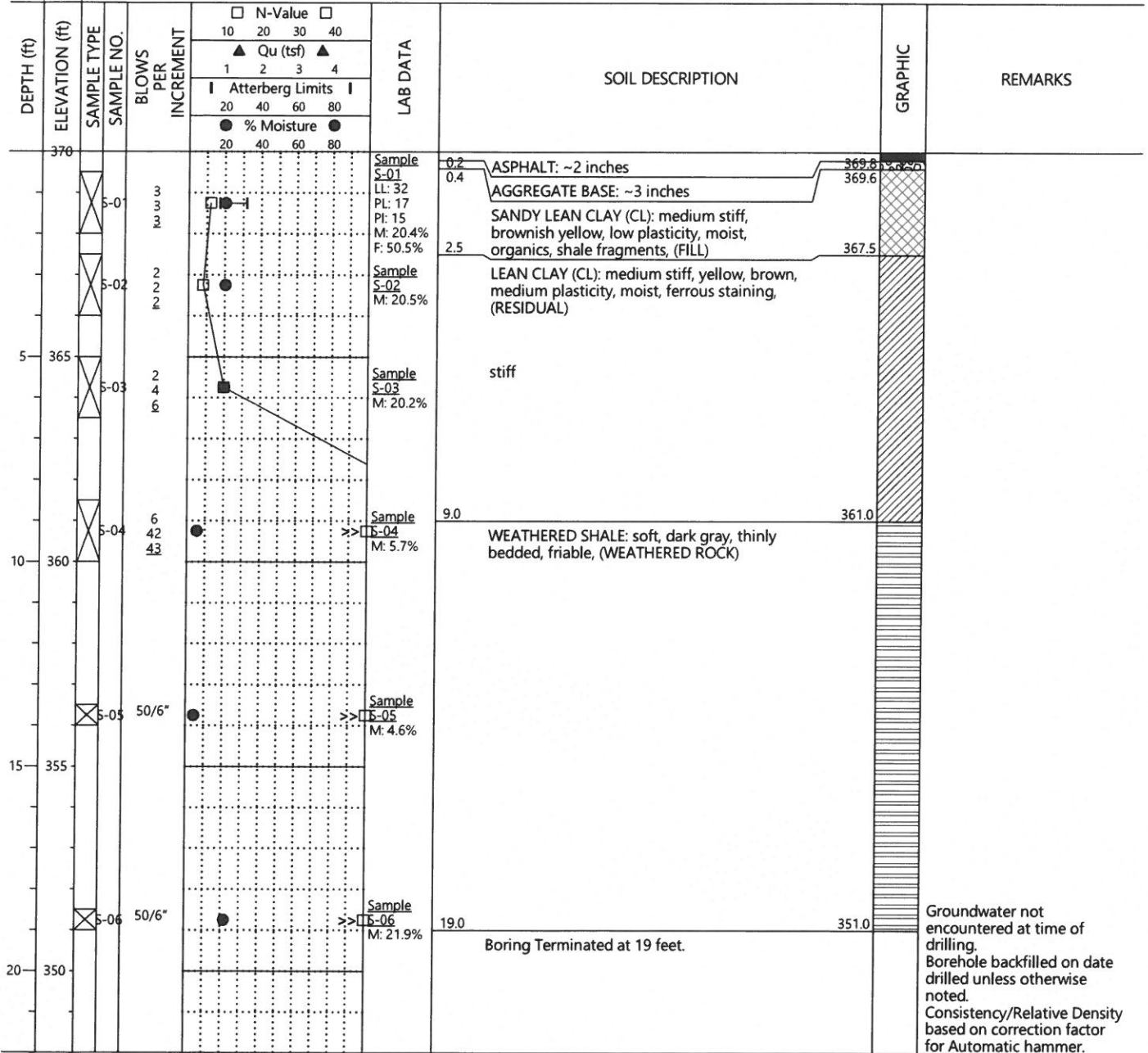


SAMPLE TYPE Split Spoon

- | | | |
|---|---|--|
| N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206) | REC RECOVERY | LL : LIQUID LIMIT M : NATURAL MOISTURE CONTENT |
| % MOISTURE PERCENT NATURAL MOISTURE CONTENT | RQD ROCK QUALITY DESIGNATION | PL : PLASTIC LIMIT F : PERCENT PASSING NO. 200 SIEVE |
| <input checked="" type="checkbox"/> GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING | UD UNDISTURBED | PI : PLASTICITY INDEX |
| <input checked="" type="checkbox"/> STABILIZED GROUNDWATER LEVEL | Qu POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH | |

PROJECT NAME: Johnson County Courthouse Addition
 PROJECT NUMBER: LR240224
 DRILLING METHOD: Hollow Stem Auger
 EQUIPMENT USED: Geoprobe 7822DT
 HAMMER TYPE: Automatic
 BORING LOCATION: 35.455743°, -93.458971°

LOCATION: Clarksville, Arkansas
 DATE DRILLED: 11/18/24
 WEATHER: Cloudy/Rain
 ELEVATION: 370
 DRILL CREW: Building & Earth
 LOGGED BY: J. St. Pierre



SAMPLE TYPE Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206)	REC RECOVERY	LL: LIQUID LIMIT	M: NATURAL MOISTURE CONTENT
% MOISTURE PERCENT NATURAL MOISTURE CONTENT	RQD ROCK QUALITY DESIGNATION	PL: PLASTIC LIMIT	F: PERCENT PASSING NO. 200 SIEVE
GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING	UD UNDISTURBED	PI: PLASTICITY INDEX	
STABILIZED GROUNDWATER LEVEL	Qu POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH		



Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

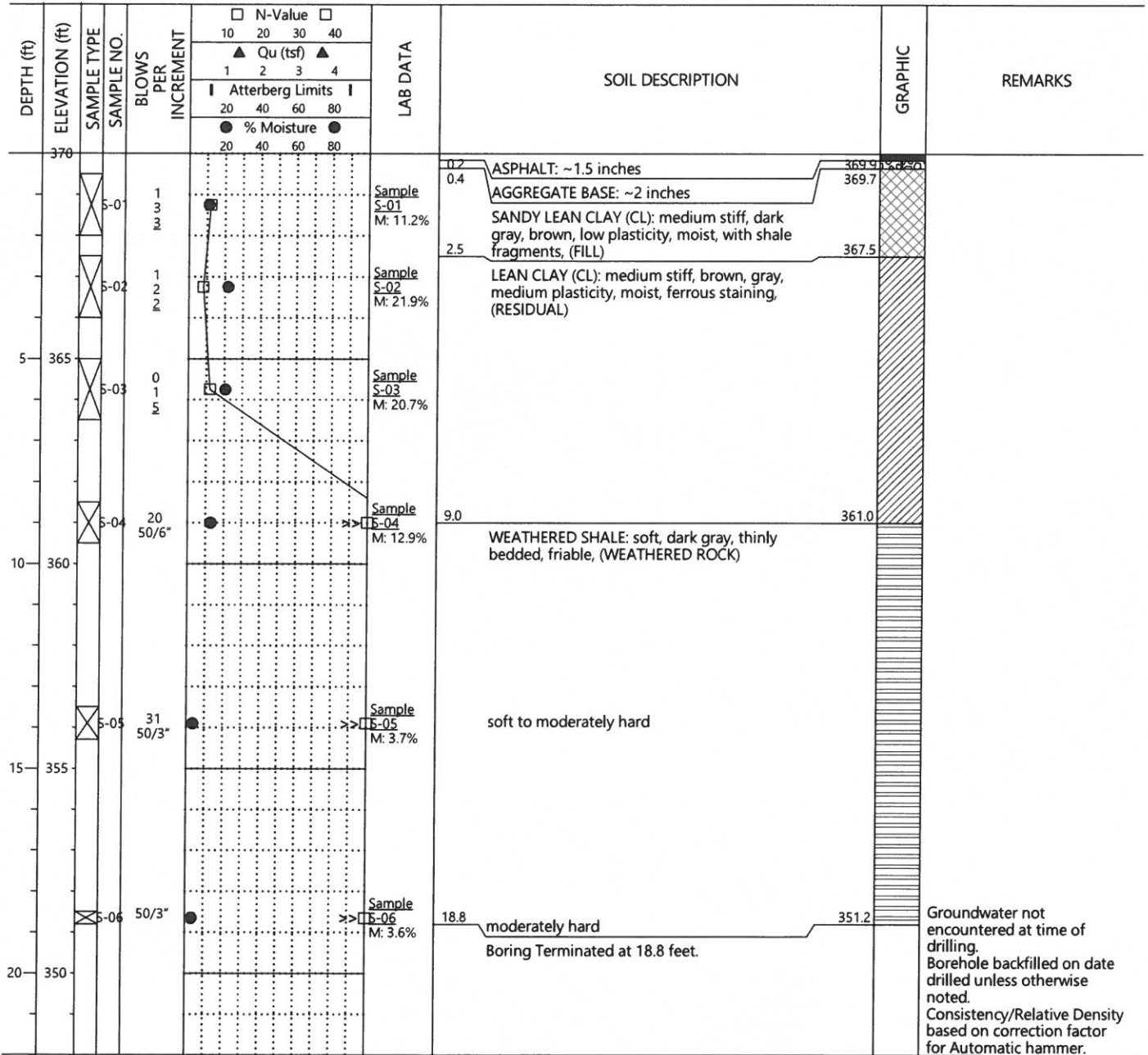
Designation: B-04

Sheet 1 of 1

29 Collins Industrial Place, Bldg. 1, Ste. C
 North Little Rock, Arkansas 72113
 Office: (501) 504-6929
sscheiderer@buildingandearth.com

PROJECT NAME: Johnson County Courthouse Addition
 PROJECT NUMBER: LR240224
 DRILLING METHOD: Hollow Stem Auger
 EQUIPMENT USED: Geoprobe 7822DT
 HAMMER TYPE: Automatic
 BORING LOCATION: 35.455740°, -93.458867°

LOCATION: Clarksville, Arkansas
 DATE DRILLED: 11/18/24
 WEATHER: Cloudy/Rain
 ELEVATION: 370
 DRILL CREW: Building & Earth
 LOGGED BY: J. St. Pierre



SAMPLE TYPE Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206) **REC** RECOVERY **LL:** LIQUID LIMIT **M:** NATURAL MOISTURE CONTENT
% MOISTURE PERCENT NATURAL MOISTURE CONTENT **RQD** ROCK QUALITY DESIGNATION **PL:** PLASTIC LIMIT **F:** PERCENT PASSING NO. 200 SIEVE
 GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING **UD** UNDISTURBED **PI:** PLASTICITY INDEX
 STABILIZED GROUNDWATER LEVEL **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH



Geotechnical, Environmental, and Materials Engineers

LOG OF BORING

Designation: B-05

Sheet 1 of 1

29 Collins Industrial Place, Bldg. 1, Ste. C

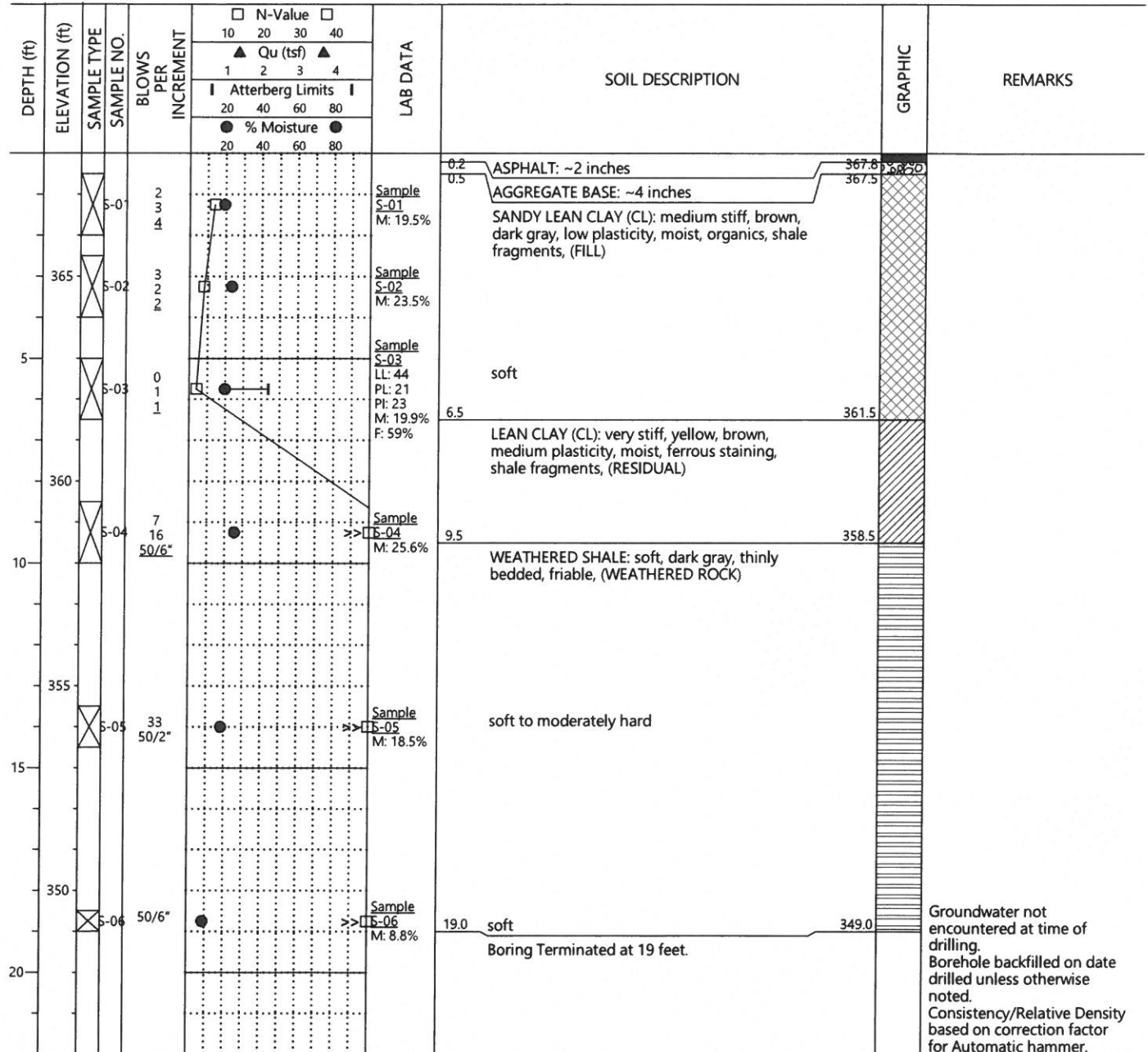
North Little Rock, Arkansas 72113

Office: (501) 504-6929

sscheiderer@buildingandearth.com

PROJECT NAME: Johnson County Courthouse Addition
 PROJECT NUMBER: LR240224
 DRILLING METHOD: Hollow Stem Auger
 EQUIPMENT USED: Geoprobe 7822DT
 HAMMER TYPE: Automatic
 BORING LOCATION: 35.455739°,-93.458730°

LOCATION: Clarksville, Arkansas
 DATE DRILLED: 11/18/24
 WEATHER: Cloudy/Rain
 ELEVATION: 368
 DRILL CREW: Building & Earth
 LOGGED BY: J. St. Pierre

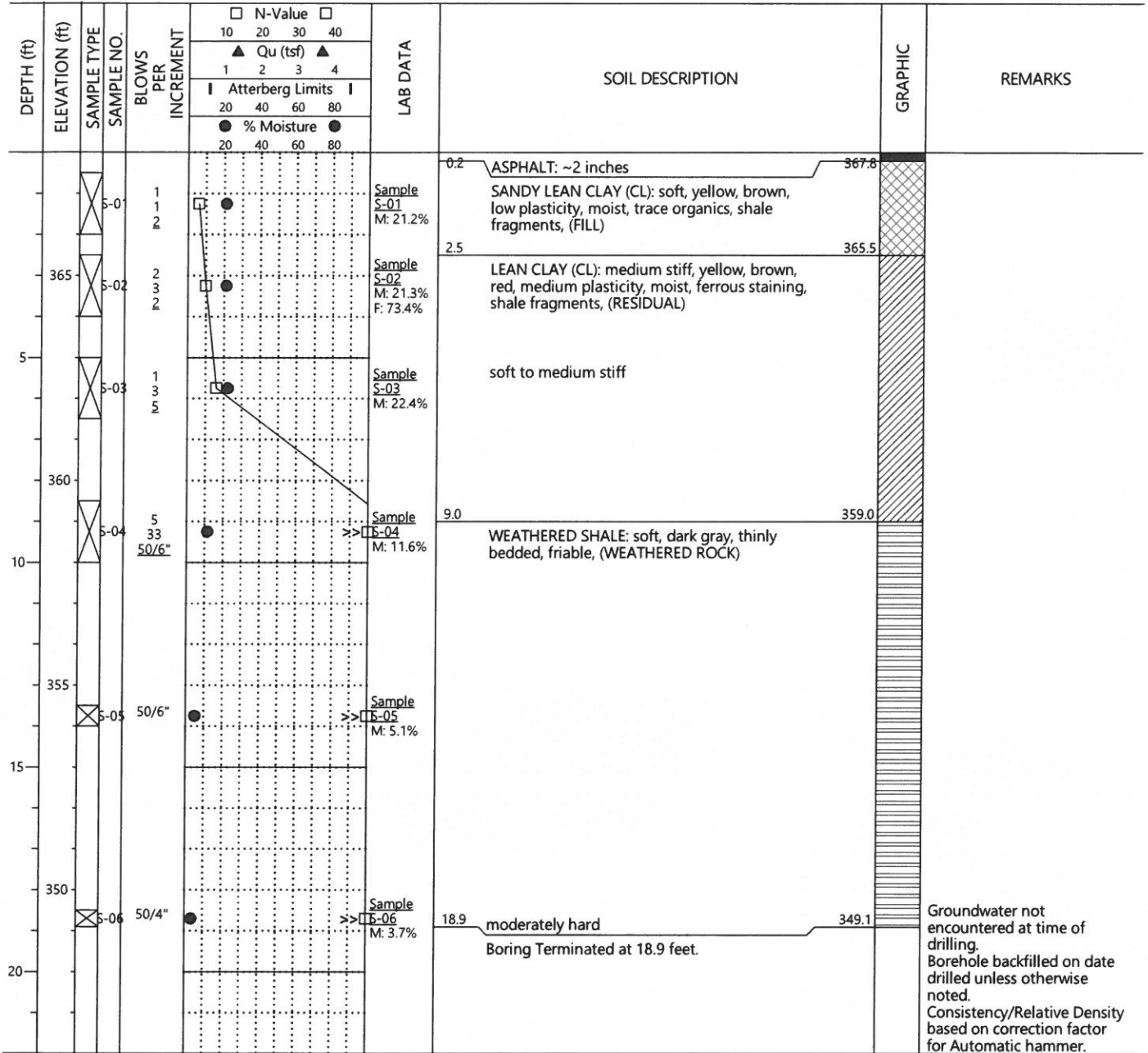


SAMPLE TYPE Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206) **REC** RECOVERY **LL:** LIQUID LIMIT **M:** NATURAL MOISTURE CONTENT
% MOISTURE STANDARD NATURAL MOISTURE CONTENT **RQD** ROCK QUALITY DESIGNATION **PL:** PLASTIC LIMIT **F:** PERCENT PASSING NO. 200 SIEVE
 GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING **UD** UNDISTURBED **PI:** PLASTICITY INDEX
 STABILIZED GROUNDWATER LEVEL **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

PROJECT NAME: Johnson County Courthouse Addition
 PROJECT NUMBER: LR240224
 DRILLING METHOD: Hollow Stem Auger
 EQUIPMENT USED: Geoprobe 7822DT
 HAMMER TYPE: Automatic
 BORING LOCATION: 35.455654°,-93.458867°

LOCATION: Clarksville, Arkansas
 DATE DRILLED: 11/19/24
 WEATHER: Cloudy/Rain
 ELEVATION: 368
 DRILL CREW: Building & Earth
 LOGGED BY: J. St. Pierre



SAMPLE TYPE Split Spoon

N-VALUE STANDARD PENETRATION RESISTANCE (AASHTO T-206) **REC** RECOVERY **LL:** LIQUID LIMIT **M:** NATURAL MOISTURE CONTENT
% MOISTURE PERCENT NATURAL MOISTURE CONTENT **RQD** ROCK QUALITY DESIGNATION **PL:** PLASTIC LIMIT **F:** PERCENT PASSING NO. 200 SIEVE
 GROUNDWATER LEVEL IN THE BOREHOLE AT TIME OF DRILLING **UD** UNDISTURBED **PI:** PLASTICITY INDEX
 STABILIZED GROUNDWATER LEVEL **Qu** POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH

A-5
LABORATORY TEST RESULTS

LABORATORY TEST RESULTS

The results of the laboratory testing are presented in the following tables.

BORING NO.	DEPTH	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	% PASSING #200 SIEVE	CLASSIFICATION
B-01	0.5 - 2.0	22.9	36	18	18	71	CL
B-01	2.5 - 4.0	25.5					
B-01	5.0 - 6.5	15.6					
B-01	8.5 - 9.0	9.5					
B-01	13.5 - 15.0	3.4					
B-01	18.5 - 19.0	3.0					
B-02	0.5 - 2.0	25.5					
B-02	2.5 - 4.0	17.2					
B-02	5.0 - 6.5	22.2					
B-02	8.5 - 10.0	10.4					
B-02	13.5 - 14.0	7.0					
B-02	18.5 - 19.0	3.3					
B-03	0.5 - 2.0	20.4	32	17	15	50	CL
B-03	2.5 - 4.0	20.5					
B-03	5.0 - 6.5	20.2					
B-03	8.5 - 10.0	5.7					
B-03	13.5 - 14.0	4.6					
B-03	18.5 - 20.0	21.9					
B-04	0.5 - 2.0	11.2					
B-04	2.5 - 4.0	21.9					
B-04	5.0 - 6.5	20.7					
B-04	8.5 - 10.0	12.9					
B-04	13.5 - 15.0	3.7					
B-04	18.5 - 19.0	3.6					
B-05	0.5 - 2.0	19.5					
B-05	2.5 - 4.0	23.5					
B-05	5.0 - 6.5	19.9	44	21	23	59	CL
B-05	8.5 - 10.0	25.6					
B-05	13.5 - 14.5	18.5					
B-05	18.5 - 19.0	8.8					
B-06	0.5 - 2.0	21.2					

TABLE L-1: General Soil Classification Test Results

Soils with a Liquid Limit (LL) greater than 50 and Plasticity Index (PI) greater than 25 usually exhibit significant volume change with varying moisture content and are considered to be highly plastic
⁽¹⁾ Indicates visual classification. WR indicates weathered rock.

A-6
LABORATORY TEST PROCEDURES

A brief description of the laboratory tests performed is provided in the following sections.

DESCRIPTION OF SOILS (VISUAL-MANUAL PROCEDURE) (ASTM D2488)

The soil samples were visually examined by our engineer and soil descriptions were provided. Representative samples were then selected and tested in accordance with the aforementioned laboratory-testing program to determine soil classifications and engineering properties. This data was used to correlate our visual descriptions with the Unified Soil Classification System (USCS).

NATURAL MOISTURE CONTENT (ASTM D2216)

Natural moisture contents (M%) were determined on selected samples. The natural moisture content is the ratio, expressed as a percentage, of the weight of water in a given amount of soil to the weight of solid particles.

ATTERBERG LIMITS (ASTM D4318)

The Atterberg Limits test was performed to evaluate the soil's plasticity characteristics. The soil Plasticity Index (PI) is representative of this characteristic and is bracketed by the Liquid Limit (LL) and the Plastic Limit (PL). The Liquid Limit is the moisture content at which the soil will flow as a heavy viscous fluid. The Plastic Limit is the moisture content at which the soil is between "plastic" and the semi-solid stage. The Plasticity Index ($PI = LL - PL$) is a frequently used indicator for a soil's potential for volume change. Typically, a soil's potential for volume change increases with higher Plasticity Indices.

MATERIAL FINER THAN NO. 200 SIEVE BY WASHING (ASTM D1140)

Grain-size tests were performed to determine the partial soil particle size distribution. The amount of material finer than the openings on the No. 200 sieve (0.075 mm) was determined by washing soil over the No. 200 sieve. The results of wash #200 tests are presented on the boring logs included in this report and in the table of laboratory test results.

A-7

GEOTECHNICAL INVESTIGATION METHODOLOGIES

The subsurface exploration, which is the basis of the recommendations of this report, has been performed in accordance with industry standards. Detailed methodologies employed in the investigation are presented in the following sections.

DRILLING PROCEDURES - STANDARD PENETRATION TEST (ASTM D1586)

At each boring location, soil samples were obtained at standard sampling intervals with a split-spoon sampler. The borehole was first advanced to the sample depth by augering and the sampling tools were placed in the open hole. The sampler was then driven 18 inches into the ground with a 140-pound automatic hammer free-falling 30 inches. The number of blows required to drive the sampler each 6-inch increment was recorded. The initial increment is considered the "seating" blows, where the sampler penetrates loose or disturbed soil in the bottom of the borehole.

The blows required to penetrate the final two (2) increments are added together and are referred to as the Standard Penetration Test (SPT) N-value. The N-value, when properly evaluated, gives an indication of the soil's strength and ability to support structural loads. Many factors can affect the SPT N-value, so this result cannot be used exclusively to evaluate soil conditions.

The SPT testing was performed using a drill rig equipped with an automatic hammer. Automatic hammers mechanically control the height of the hammer drop, and doing so, deliver higher energy efficiency (90 to 99% efficiency) than manual hammers (60% efficiency) which are dropped using a manually operated rope and cathead system. Because historic data correlations were developed based on use of a manual hammer, it is necessary to adjust the N-values obtained using an automatic hammer to make these correlations valid. Therefore, an energy correction factor of 1.3 was applied to the recorded field N-values from the automatic hammer for the purpose of our evaluation. The N-values discussed or mentioned in this report and shown on the boring logs are recorded field values.

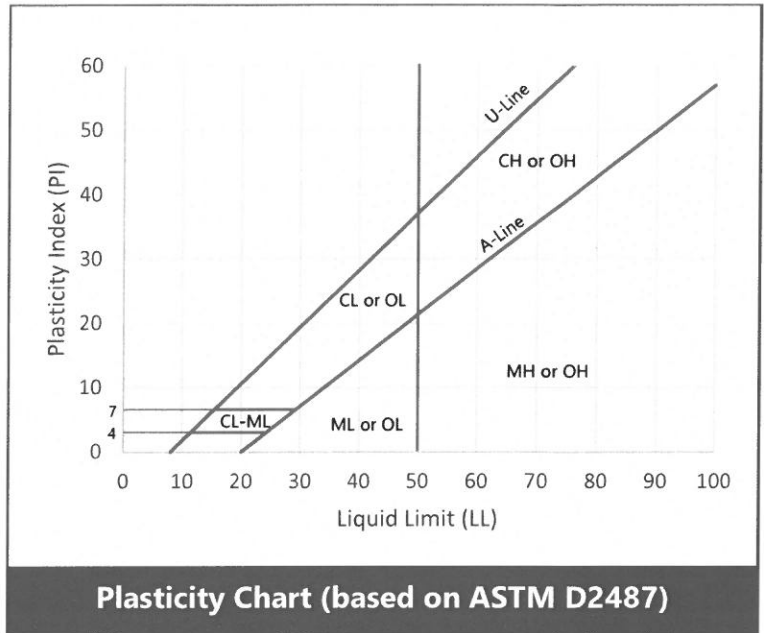
Samples retrieved from the boring locations were labeled and stored in plastic bags at the jobsite before being transported to our laboratory for analysis. The project engineer prepared Boring Logs summarizing the subsurface conditions at the boring locations.

SOIL CLASSIFICATION METHODOLOGY

Major Divisions			Symbols		Group Name & Typical Description
			Lithology	Group	
Coarse Grained Soils More than 50% of material is larger than No. 200 sieve size	Gravel and Gravelly Soils More than 50% of coarse fraction is larger than No. 4 sieve	Clean Gravels (Less than 5% fines)		GW	Well-graded gravels, gravel – sand mixtures, little or no fines
				GP	Poorly-graded gravels, gravel – sand mixtures, little or no fines
		Gravels with Fines (More than 12% fines)		GM	Silty gravels, gravel – sand – silt mixtures
				GC	Clayey gravels, gravel – sand – clay mixtures
	Sand and Sandy Soils More than 50% of coarse fraction is smaller than No. 4 sieve	Clean Sands (Less than 5% fines)		SW	Well-graded sands, gravelly sands, little or no fines
				SP	Poorly-graded sands, gravelly sands, little or no fines
		Sands with Fines (More than 12% fines)		SM	Silty sands, sand – silt mixtures
				SC	Clayey sands, sand – clay mixtures
Fine Grained Soils More than 50% of material is smaller than No. 200 sieve size	Silts and Clays Liquid Limit less than 50	Inorganic		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silt with slight plasticity
				CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		Organic		OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays Liquid Limit greater than 50	Inorganic		MH	Inorganic silts, micaceous or diatomaceous fine sand, or silty soils
				CH	Inorganic clays of high plasticity
		Organic		OH	Organic clays of medium to high plasticity, organic silts
Highly Organic Soils				PT	Peat, humus, swamp soils with high organic contents

Soil Classification Chart (based on ASTM D2487)

Building & Earth Sciences classifies soil in general accordance with the Unified Soil Classification System (USCS) presented in ASTM D2487. Table 1 and Figure 1 exemplify the general guidance of the USCS. Soil consistencies and relative densities are presented in general accordance with Terzaghi, Peck, & Mesri's (1996) method, as shown on Table 2, when quantitative field and/or laboratory data is available. Table 2 includes Consistency and Relative Density correlations with N-values obtained using either a manual hammer (60 percent efficiency) or automatic hammer (90 percent efficiency). The *Blows Per Increment* and *SPT N-values* displayed on the boring logs are the unaltered values measured in the field. When field and/or laboratory data is not available, we may classify soil in general accordance with the Visual Manual Procedure presented in ASTM D2488.











Plasticity Chart (based on ASTM D2487)

Non-cohesive: Coarse-Grained Soil		Cohesive: Fine-Grained Soil				
SPT Penetration (blows/foot)		Relative Density	SPT Penetration (blows/foot)		Consistency	Estimated Range of Unconfined Compressive Strength (tsf)
			Automatic Hammer*	Manual Hammer		
Automatic Hammer*	Manual Hammer		< 2	< 2	Very Soft	< 0.25
0 - 3	0 - 4	Very Loose	2 - 3	2 - 4	Soft	0.25 - 0.50
3 - 8	4 - 10	Loose	3 - 6	4 - 8	Medium Stiff	0.50 - 1.00
8 - 23	10 - 30	Medium Dense	6 - 12	8 - 15	Stiff	1.00 - 2.00
23 - 38	30 - 50	Dense	12 - 23	15 - 30	Very Stiff	2.00 - 4.00
> 38	> 50	Very Dense	> 23	> 30	Hard	> 4.00





Soil Consistency and Relative Density (based on Terzaghi, Peck & Mesri, 1996)

* - Modified based on 80% hammer efficiency

KEY TO LOGS

	Standard Penetration Test ASTM D1586 or AASHTO T-206		Dynamic Cone Penetrometer (Sower DCP) ASTM STP-399
	Shelby Tube Sampler ASTM D1587		No Sample Recovery
	Rock Core Sample ASTM D2113		Groundwater at Time of Drilling
	Auger Cuttings		Groundwater as Indicated
Symbol Legend			

Soil	Particle Size	U.S. Standard
Boulders	Larger than 300 mm	N.A.
Cobbles	300 mm to 75 mm	N.A.
Gravel	75 mm to 4.75 mm	3-inch to #4 sieve
Coarse	75 mm to 19 mm	3-inch to 3/4-inch sieve
Fine	19 mm to 4.75 mm	3/4-inch to #4 sieve
Sand	4.75 mm to 0.075 mm	#4 to #200 Sieve
Coarse	4.75 mm to 2 mm	#4 to #10 Sieve
Medium	2 mm to 0.425 mm	#10 to #40 Sieve
Fine	0.425 mm to 0.075 mm	#40 to #200 Sieve
Fines	Less than 0.075 mm	Passing #200 Sieve
Silt	0.075 mm to 2 µm	N.A.
Clay	Less than 2 µm	N.A.
Standard Sieve Sizes		

N-Value 	Standard Penetration Test Resistance calculated using ASTM D1586 or AASHTO T-206. Calculated as sum of original, field recorded values.	Atterberg Limits 	A measure of a soil's plasticity characteristics in general accordance with ASTM D4318. The soil Plasticity Index (PI) is representative of this characteristic and is bracketed by the Liquid Limit (LL) and the Plastic Limit (PL).
Qu 	Unconfined compressive strength, typically estimated from a pocket penetrometer. Results are presented in tons per square foot (tsf).	% Moisture 	Percent natural moisture content in general accordance with ASTM D2216.
Soil Data			

Hollow Stem Auger	Flights on the outside of the shaft advance soil cuttings to the surface. The hollow stem allows sampling through the middle of the auger flights.
Mud Rotary / Wash Bore	A cutting head advances the boring and discharges a drilling fluid to support the borehole and circulate cuttings to the surface.
Solid Flight Auger	Flights on the outside bring soil cuttings to the surface. Solid stem requires removal from borehole during sampling.
Hand Auger	Cylindrical bucket (typically 3-inch diameter and 8 inches long) attached to a metal rod and turned by human force.

Descriptor	Meaning
Trace	Likely less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

Soil Drilling Methods

Descriptors

Manual Hammer	The operator tightens and loosens the rope around a rotating drum assembly to lift and drop a sliding, 140-pound hammer falling 30 inches.
Automatic Trip Hammer	An automatic mechanism is used to lift and drop a sliding, 140-pound hammer falling 30 inches.
Dynamic Cone Penetrometer (Sower DCP) ASTM STP-399	Uses a 15-pound steel mass falling 20 inches to strike an anvil and cause penetration of a 1.5-inch diameter cone seated in the bottom of a hand augered borehole. The blows required to drive the embedded cone a depth of 1-3/4 inches have been correlated by others to N-values derived from the Standard Penetration Test (SPT).

Sampling Methods

Non-plastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be re-rolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be re-rolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

Plasticity

Dry	Absence of moisture, dusty, dry to the touch.
Moist	Damp but no visible water.
Wet	Visible free water, usually soil is below water table.

Moisture Condition

Stratified	Alternating layers of varying material or color with layers at least 1/2 inch thick.
Laminated	Alternating layers of varying material or color with layers less than 1/4 inch thick.
Fissured	Breaks along definite planes of fracture with little resistance to fracturing.
Slickensides	Fracture planes appear polished or glossy, sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay.
Homogeneous	Same color and appearance throughout.

Structure

KEY TO HATCHES

Hatch	Description	Hatch	Description	Hatch	Description
	GW - Well-graded gravels, gravel – sand mixtures, little or no fines		Asphalt		Clay with Gravel
	GP - Poorly-graded gravels, gravel – sand mixtures, little or no fines		Aggregate Base		Sand with Gravel
	GM - Silty gravels, gravel – sand – silt mixtures		Topsoil		Silt with Gravel
	GC - Clayey gravels, gravel – sand – clay mixtures		Concrete		Gravel with Sand
	SW - Well-graded sands, gravelly sands, little or no fines		Coal		Gravel with Clay
	SP - Poorly-graded sands, gravelly sands, little or no fines		CL-ML - Silty Clay		Gravel with Silt
	SM - Silty sands, sand – silt mixtures		Sandy Clay		Limestone
	SC - Clayey sands, sand – clay mixtures		Clayey Chert		Chalk
	ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silt with slight plasticity		Low and High Plasticity Clay		Siltstone
	CL - Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		Low Plasticity Silt and Clay		Till
	OL - Organic silts and organic silty clays of low plasticity		High Plasticity Silt and Clay		Sandy Clay with Cobbles and Boulders
	MH - Inorganic silts, micaceous or diatomaceous fine sand, or silty soils		Fill		Sandstone with Shale
	CH - Inorganic clays of high plasticity		Weathered Rock		Coral
	OH - Organic clays of medium to high plasticity, organic silts		Sandstone		Boulders and Cobbles
	PT - Peat, humus, swamp soils with high organic contents		Shale		Soil and Weathered Rock

Key to Hatches Used for Boring Logs and Soil Profiles

**IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL-ENGINEERING
REPORT**

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you — should apply this report for any purpose or project except the one originally contemplated.*

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an

assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by: the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. Contact the geotechnical engineer before applying this report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.*

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time to perform additional study.* Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help

others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold-prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical-engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.



8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@geoprofessional.org www.geoprofessional.org

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PART 1 GENERAL

1.01 SUMMARY

A. GENERAL DESCRIPTION: These Forms are provided to be used during the course of the project but are not limited to the following:

1. Request for Information
2. Electronic File Waiver Form
3. Substitution Request Form – See section 01 25 00 – Substitutions & Product Options
4. Certificate of Completion/Final Waiver of Lien (Sample)
5. AIA G701/CMa – Change Order (Sample)
6. AIA G705 – List of Subcontractor (Sample)
7. AIA G732/CMa - Application for Payment (Sample)
8. AIA G703/CMa – Continuation (Sample)
9. AIA A132 – Owner and Contractor Agreement (Sample)

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION

**Request for Interpretation
RFI**

Fax To: **Smith-Doyle Contractors, Inc.** **RFI#** _____
Attn: Jason Roberts, Project Manager
Fax No. 901 / 213-3994

Submitted by: _____ **Fax No.** _____
(Company Name, Contact Name)

Subject of RFI: _____

Section and/or Drawing Number: _____

Information Requested: _____

The following response does not authorize a change in the contract sum or contract time.

Response:

By: _____ **Date:** _____

Cc:

End of Form

Electronic Files Waiver

Contractor: _____ **Date:** _____

Address: _____

Email: _____

Phone: _____

At your request, SpiritArchitecture Group, LLC, OGCB Inc and/or Burr Cole Consulting Engineers, Inc (Architect/Engineer) will provide electronic files for your convenience and use for the creation of shop drawing submittals only, as related to the project. Subject to the following terms and conditions:

The Architect/Engineers' electronic files are compatible with: AUTOCAD 2010. The Architect/Engineer makes no representation as to the compatibility of these files with your hardware or your software beyond the specified release of the referenced specifications.

Data contained on these electronic files is part of the Architect/Engineer's, Owner's, and Construction Manager's (CM.) instruments of service and shall not be copied for distribution to others or used by you or anyone else receiving this data through or from you for any purpose other than as a convenience in the preparation of Bid Packages for the specific referenced project. Any other use or reuse by you or others will be at your sole risk and without liability or legal exposure to the Architect/Engineer, Owner, or CM. You agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against the Architect/Engineer, Owner and CM., their officers, directors, employees, agents, or sub-consultants, which may arise out of or in connection with your use of the electronic files.

Furthermore, you shall, to the fullest extent permitted by law, indemnify and hold harmless the Architect/Engineer, Owner, and CM., from all claims, damages, losses, and expenses, including attorney's fees arising out of or resulting from your use of these electronic files.

These electronic files are not contract documents. Significant differences may exist between these electronic files and corresponding hard copy contract documents due to addenda, change orders or other revisions. The Architect/Engineer, Owner and CM. make no representation regarding the accuracy or completeness of the electronic files you receive. If a conflict arises between the signed contract documents prepared by the Architect and electronic files, the signed contract documents shall govern. You are responsible for determining if any conflict exists. By your use of these electronic files, you are not relieved of your duty to fully comply with the contract documents, including and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, verify field conditions, and coordinate your work with that of other contractors for the project.

Because of the potential that the information presented on the electronic files could be modified, unintentionally or otherwise, the Architect/Engineer, CM, and Owner reserve the right to remove all indication of their or the Owner's ownership and/or involvement from each electronic display.

As a condition of sending you CAD files, (by diskette or e-mail), the letter below must be signed by a representative of your firm having authority of ownership, stating that your firm will abide by the same agreement. The Architect/Engineer will furnish you electronic files of the following drawing sheet numbers:

A service fee of \$300.00 for the first sheet of a request and \$50.00 for each additional sheet shall be charged. The electronic files will be forwarded after the full payment and signed agreement is received.

Under no circumstances shall delivery of the electronic files for use by your firm be deemed a sale by the Architect/Engineer and Architect/Engineer makes no warranties, either expressed or implied, of merchantability and fitness for any particular purpose. In no event shall the Architect/Engineer be liable for any loss of profit or any consequential damages.

SpiritArchitecture Group, LLC
108 E Mulberry Street
Collierville, Tennessee 38017
(901) 457-7688
Fax: (901) 457-7689
E-mail: www.spiritarchitecture.com

Contractor's Authorized Agent
Printed Name:

End of Form

CERTIFICATE OF COMPLETION / FINAL WAIVER OF LIEN

OWNER JOHNSON COUNTY GOVERNMENT, AR ARCHITECT / ENGINEER Project No. 24-009A

Project / Work Description:

WITNESSETH: The work under the above contract between Little River County Government, AR, (hereinafter called the Owner), and the undersigned Contractor is completed. The Contractor further certifies and agrees that the Owner, its officials and agents, are hereby released from any and all claims and demands whatsoever arising under or by such contract, that the Contractor performed the work according to the Plans and Specifications for the above project which were a part of the contract, that there are no liens, demands or claims against the Contractor, any subcontractor or the Owner arising out of work of the contract, and that the Contractor shall indemnify and hold the Owner harmless from any and all such liens, claims, and demands which may be made. The Contractor guarantees and warrants the work performed under the above contract for One (1) YEAR against any and all defects of material and/or workmanship from this date.

Signed and dated on _____, 20_____.

WITNESS

CONTRACTOR

Subscribed and sworn to before me on
this ____ day of _____, 20_____.

Notary Public

My commission expires: _____

(If the Contractor is a corporation, the following certificate will be executed)

I, _____ certify that I am Secretary of the Corporation executing this release;
that _____ who signed this release on behalf of the Contractor was
then _____ of said Corporation; that said release was duly signed for and
on behalf of said Corporation by authority of its governing body, and is within the scope of corporate powers:

Corporate Seal

Secretary

Contractor

Date

This project is acceptable for final approval, and we recommend that it be ordained so.

SpiritArchitecture Group, LLC.
108 E Mulberry Street
Collierville, TN 38017

Final Cost \$ _____

Architect / Engineer

Date

Owner

Date

End of Form

CHANGE ORDER
CONSTRUCTION MANAGER-ADVISER EDITION
AIA DOCUMENT G701/CMa

- OWNER
- CONSTRUCTION MANAGER
- ARCHITECT
- CONTRACTOR
- FIELD
- OTHER

(Instructions on reverse side)

PROJECT:
(Name and address)

CHANGE ORDER NO.:

INITIATION DATE:

TO CONTRACTOR:
(Name and address)

PROJECT NOS.:

CONTRACT FOR:

CONTRACT DATE:

The Contract is changed as follows:

SAMPLE

This standard document is NOT a model form. Its inclusion in the Architect's Handbook of Professional Practice, 12th Edition, does not constitute a grant of any implied or explicit license to copy it in whole or in part. See the Instruction Sheet for information on licensed reproduction.

Not valid until signed by the Owner, Construction Manager, Architect and Contractor.

The original (Contract Sum) (Guaranteed Maximum Price) was \$
 Net change by previously authorized Change Orders \$
 The (Contract Sum) (Guaranteed Maximum Price) prior to this Change Order was \$
 The (Contract Sum) (Guaranteed Maximum Price) will be (increased) (decreased) (unchanged) by
 this Change Order \$
 The new (Contract Sum) (Guaranteed Maximum Price) including this Change Order will be \$
 The Contract Time will be (increased) (decreased) (unchanged) by () days
 The date of Substantial Completion as of the date of this Change Order therefore is

NOTE: This summary does not reflect changes in the Contract Sum, Contract Time or Guaranteed Maximum Price which have been authorized by Construction Change Directive.

CONSTRUCTION MANAGER

ADDRESS

BY DATE

ARCHITECT

ADDRESS

BY DATE

CONTRACTOR

ADDRESS

BY DATE

OWNER

ADDRESS

BY DATE

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 **AIA[®] Document G705[™] – 2001**

List of Subcontractors

PROJECT: *(Name and address)*

DATE:

TO ARCHITECT: *(Name and address)*

ARCHITECT'S PROJECT NUMBER:

FROM CONTRACTOR: *(Name and Address)*

CONTRACTOR'S PROJECT NUMBER :

(List Subcontractors and others proposed to be employed on the above Project as required by the bidding documents.)

Work/Firm Name

Address/Phone

Superintendent

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051711ACD44



Application and Certificate for Payment, Construction Manager as Adviser Edition

TO OWNER: PROJECT: APPLICATION NO: _____

Distribution to: OWNER: CONSTRUCTION MANAGER:
 ARCHITECT: CONTRACTOR:
 FIELD: OTHER:

PERIOD TO: _____
 CONTRACT DATE: _____
 PROJECT NOS: _____ / _____

FROM: VIA CONSTRUCTION MANAGER: _____
 CONTRACTOR: VIA ARCHITECT: _____

CONTRACT FOR: General Construction

CONTRACTOR'S APPLICATION FOR PAYMENT
 Application is made for payment, as shown below, in connection with the Contract. AIA Document G703™, Continuation Sheet, is attached.

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

1. ORIGINAL CONTRACT SUM \$0.00
 2. NET CHANGES IN THE WORK \$0.00
 3. CONTRACT SUM TO DATE (Line 1 ± 2) \$0.00 By: _____ Date: _____
 4. TOTAL COMPLETED AND STORED TO DATE (Column G on G703) \$0.00 State of: _____
 5. RETAINAGE:
 a. 0 % of Completed Work (Column D + E on G703) \$0.00
 b. 0 % of Stored Material (Column F on G703) \$0.00

County of: _____
 Subscribed and sworn to before me this _____ day of _____
 Notary Public: _____
 My Commission expires: _____

CERTIFICATE FOR PAYMENT
 In accordance with the Contract Documents, based on evaluations of the Work and the data comprising this application, the Construction Manager and Architect certify to the Owner that to the best of their knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED \$0.00
 (Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

CONSTRUCTION MANAGER: _____
 By: _____ Date: _____

ARCHITECT: (NOTE: If multiple Contractors are responsible for performing portions of the Project, the Architect's Certification is not required.)
 By: _____ Date: _____

SUMMARY OF CHANGES IN THE WORK	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	\$0.00	\$0.00
Total approved this month including Construction Change Directives	\$0.00	\$0.00
TOTALS	\$0.00	\$0.00
NET CHANGES IN THE WORK		\$0.00

8. CURRENT PAYMENT DUE \$0.00
 9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 minus Line 6) \$0.00

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AIA® Document G703® - 1992

Continuation Sheet

AIA Document G702®, Application and Certification for Payment, or G732™, Application and Certificate for Payment, Construction Manager as Adviser Edition, containing Contractor's signed certification is attached.
 Use Column I on Contracts where variable retainage for line items may apply.

A		B				C	D		E	F	G		H	I	
							WORK COMPLETED				MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D + E + F)			% (G ÷ C)
							FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD							
			0.00	0.00	0.00	0.00%		0.00	0.00	0.00		0.00	0.00		
			0.00	0.00	0.00	0.00%		0.00	0.00	0.00		0.00	0.00		
			0.00	0.00	0.00	0.00%		0.00	0.00	0.00		0.00	0.00		
			0.00	0.00	0.00	0.00%		0.00	0.00	0.00		0.00	0.00		
			0.00	0.00	0.00	0.00%		0.00	0.00	0.00		0.00	0.00		
			0.00	0.00	0.00	0.00%		0.00	0.00	0.00		0.00	0.00		
			0.00	0.00	0.00	0.00%		0.00	0.00	0.00		0.00	0.00		
			0.00	0.00	0.00	0.00%		0.00	0.00	0.00		0.00	0.00		
			0.00	0.00	0.00	0.00%		0.00	0.00	0.00		0.00	0.00		
			0.00	0.00	0.00	0.00%		0.00	0.00	0.00		0.00	0.00		
			0.00	0.00	0.00	0.00%		0.00	0.00	0.00		0.00	0.00		
			0.00	0.00	0.00	0.00%		0.00	0.00	0.00		0.00	0.00		
			0.00	0.00	0.00	0.00%		0.00	0.00	0.00		0.00	0.00		
			0.00	0.00	0.00	0.00%		0.00	0.00	0.00		0.00	0.00		
			0.00	0.00	0.00	0.00%		0.00	0.00	0.00		0.00	0.00		
			0.00	0.00	0.00	0.00%		0.00	0.00	0.00		0.00	0.00		
			0.00	0.00	0.00	0.00%		0.00	0.00	0.00		0.00	0.00		
			0.00	0.00	0.00	0.00%		0.00	0.00	0.00		0.00	0.00		
			0.00	0.00	0.00	0.00%		0.00	0.00	0.00		0.00	0.00		
			0.00	0.00	0.00	0.00%		0.00	0.00	0.00		0.00	0.00		
GRAND TOTAL			0.00	0.00	0.00	0.00%	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

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User Notes: (389ADAG3)

 **AIA® Document A132™ – 2019**

**Standard Form of Agreement Between Owner and Contractor, Construction
Manager as Adviser Edition**

AGREEMENT made as of the _____ day of _____ in the year _____
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address, and other information)

and the Contractor:
(Name, legal status, address, and other information)

for the following Project:
(Name, location, and detailed description)

The Construction Manager:
(Name, legal status, address, and other information)

The Architect:
(Name, legal status, address, and other information)

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This document is intended to be used in conjunction with AIA Documents A232™-2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition; B132™-2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™-2019, Standard Form of Agreement Between Owner and Construction Manager as Adviser.

AIA Document A232™-2019 is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

The Owner and Contractor agree as follows.

Init.

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1

TABLE OF ARTICLES

- 1 THE CONTRACT DOCUMENTS
- 2 THE WORK OF THIS CONTRACT
- 3 DATE OF COMMENCEMENT AND DATES OF SUBSTANTIAL COMPLETION
- 4 CONTRACT SUM
- 5 PAYMENTS
- 6 DISPUTE RESOLUTION
- 7 TERMINATION OR SUSPENSION
- 8 MISCELLANEOUS PROVISIONS
- 9 ENUMERATION OF CONTRACT DOCUMENTS

EXHIBIT A INSURANCE AND BONDS

EXHIBIT B DETERMINATION OF THE COST OF THE WORK

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than Modifications, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND DATES OF SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:

(Check one of the following boxes.)

- The date of this Agreement.
- A date set forth in a notice to proceed issued by the Owner.
- Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

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2

§ 3.3 Substantial Completion of the Project or Portions Thereof

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the date of Substantial Completion of the Work of all of the Contractors for the Project will be:

(Insert the date of Substantial Completion of the Work of all Contractors for the Project.)

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work of all of the Contractors for the Project are to be completed prior to Substantial Completion of the entire Work of all of the Contractors for the Project, the Contractors shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date
-----------------	-----------------------------

§ 3.4 When the Work of this Contract, or any Portion Thereof, is Substantially Complete

§ 3.4.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall substantially complete the entire Work of this Contract:

(Check one of the following boxes and complete the necessary information.)

- Not later than _____ (__) calendar days from the date of commencement of the Work.
- By the following date: _____

§ 3.4.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work of this Contract are to be substantially complete prior to when the entire Work of this Contract shall be substantially complete, the Contractor shall substantially complete such portions by the following dates:

Portion of Work	Date to be substantially complete
-----------------	-----------------------------------

§ 3.4.3 If the Contractor fails to substantially complete the Work of this Contract, or portions thereof, as provided in this Section 3.4, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be one of the following:

(Check the appropriate box.)

- Stipulated Sum, in accordance with Section 4.2 below
- Cost of the Work plus the Contractor's Fee, in accordance with Section 4.3 below
- Cost of the Work plus the Contractor's Fee with a Guaranteed Maximum Price, in accordance with Section 4.4 below

(Based on the selection above, complete Section 4.2, 4.3, or 4.4 below.)

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3

§ 4.2 Stipulated Sum

§ 4.2.1 The Contract Sum shall be _____ (\$ __), subject to additions and deductions as provided in the Contract Documents.

§ 4.2.2 Alternates

§ 4.2.2.1 Alternates, if any, included in the Contract Sum:

Item	Price
------	-------

§ 4.2.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement. *(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)*

Item	Price	Conditions for Acceptance
------	-------	---------------------------

§ 4.2.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price
------	-------

§ 4.2.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit (\$0.00)
------	-----------------------	-------------------------

§ 4.3 Cost of the Work Plus Contractor's Fee without a Guaranteed Maximum Price

§ 4.3.1 The Cost of the Work is as defined in Exhibit B, Determination of the Cost of the Work.

§ 4.3.2 The Contractor's Fee:

(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee.)

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§ 4.3.3 The method of adjustment of the Contractor's Fee for changes in the Work:

§ 4.3.4 Limitations, if any, on a Subcontractor's overhead and profit for increases in the cost of its portion of the Work:

§ 4.3.5 Rental rates for Contractor-owned equipment shall not exceed _____ percent (__ %) of the standard rental rate paid at the place of the Project.

§ 4.3.6 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit (\$0.00)
------	-----------------------	-------------------------

§ 4.3.7 The Contractor shall prepare and submit to the Construction Manager, within 14 days of executing this Agreement, a written Control Estimate for the Owner's review and approval. The Control Estimate shall include the items in Section B.1 of Exhibit B, Determination of the Cost of the Work.

§ 4.4 Cost of the Work Plus Contractor's Fee with a Guaranteed Maximum Price

§ 4.4.1 The Cost of the Work is as defined in Exhibit B, Determination of the Cost of the Work.

§ 4.4.2 The Contractor's Fee:
(State a lump sum, percentage of Cost of the Work or other provision for determining the Contractor's Fee.)

§ 4.4.3 The method of adjustment of the Contractor's Fee for changes in the Work:

§ 4.4.4 Limitations, if any, on a Subcontractor's overhead and profit for increases in the cost of its portion of the Work:

§ 4.4.5 Rental rates for Contractor-owned equipment shall not exceed _____ percent (__ %) of the standard rental rate paid at the place of the Project.

§ 4.4.6 Unit Prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit (\$0.00)
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§ 4.4.7 Guaranteed Maximum Price

§ 4.4.7.1 The Contract Sum is guaranteed by the Contractor not to exceed _____ (\$ ___), subject to additions and deductions by Change Order as provided in the Contract Documents. This maximum sum is referred to in the Contract Documents as the Guaranteed Maximum Price. Costs which would cause the Guaranteed Maximum Price to be exceeded shall be paid by the Contractor without reimbursement by the Owner.

§ 4.4.7.2 Alternates

§ 4.4.7.2.1 Alternates, if any, included in the Guaranteed Maximum Price:

Item	Price
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§ 4.4.7.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement. *(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)*

Item	Price	Conditions for Acceptance
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§ 4.4.7.3 Allowances, if any, included in the Guaranteed Maximum Price: *(Identify each allowance.)*

Item	Price
------	-------

§ 4.4.7.4 Assumptions, if any, upon which the Guaranteed Maximum Price is based: *(Identify each assumption.)*

§ 4.4.8 To the extent that the Contract Documents are anticipated to require further development, the Guaranteed Maximum Price includes the costs attributable to such further development consistent with the Contract Documents and reasonably inferable therefrom. Such further development does not include changes in scope, systems, kinds and quality of materials, finishes, or equipment, all of which, if required, shall be incorporated by Change Order.

§ 4.4.9 The Owner shall authorize preparation of revisions to the Contract Documents that incorporate the agreed-upon assumptions contained in Section 4.4.7.4. The Owner shall promptly furnish such revised Contract Documents to the Contractor. The Contractor shall notify the Owner and Architect of any inconsistencies between the agreed-upon assumptions contained in Section 4.4.7.4 and the revised Contract Documents.

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§ 4.5 Liquidated damages, if any:

(Insert terms and conditions for liquidated damages, if any, to be assessed in accordance with Section 3.4.)

§ 4.6 Other:

(Insert provisions for bonus, cost savings or other incentives, if any, that might result in a change to the Contract Sum.)

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Construction Manager by the Contractor, and Certificates for Payment issued by the Construction Manager and Architect, the Owner shall make progress payments on account of the Contract Sum, to the Contractor, as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Construction Manager not later than the ____ day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the ____ day of the ____ month. If an Application for Payment is received by the Construction Manager after the application date fixed above, payment of the amount certified shall be made by the Owner not later than ____ () days after the Construction Manager receives the Application for Payment.

(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Progress Payments Where the Contract Sum is Based on a Stipulated Sum

§ 5.1.4.1 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Construction Manager and Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.4.2 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.4.3 In accordance with AIA Document A232™-2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.4.3.1 The amount of each progress payment shall first include:

- .1 That portion of the Contract Sum properly allocable to completed Work;
- .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.4.3.2 The amount of each progress payment shall then be reduced by:

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232-2019;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

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- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232–2019; and
- .5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.5 Progress Payments Where the Contract Sum is Based on the Cost of the Work without a Guaranteed Maximum Price

§ 5.1.5.1 With each Application for Payment, the Contractor shall submit the cost control information required in Exhibit B, Determination of the Cost of the Work, along with payrolls, petty cash accounts, receipted invoices, or invoices with check vouchers attached, and any other evidence required by the Owner, Construction Manager or Architect to demonstrate that payments already made by the Contractor on account of the Cost of the Work equal or exceed progress payments already received by the Contractor, plus payrolls for the period covered by the present Application for Payment, less that portion of the payments attributable to the Contractor's Fee.

§ 5.1.5.2 Applications for Payment shall show the Cost of the Work actually incurred by the Contractor through the end of the period covered by the Application for Payment and for which the Contractor has made or intends to make actual payment prior to the next Application for Payment.

§ 5.1.5.3 In accordance with AIA Document A232-2019 and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.5.3.1 The amount of each progress payment shall first include:

- .1 The Cost of the Work as described in Exhibit B, Determination of the Cost of the Work;
- .2 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified; and
- .3 The Contractor's Fee computed upon the Cost of the Work described in the preceding Section 5.1.5.3.1.1 at the rate stated in Section 4.3.2; or if the Contractor's Fee is stated as a fixed sum in Section 4.3.2 an amount which bears the same ratio to that fixed-sum Fee as the Cost of the Work included in Section 5.1.5.3.1.1 bears to a reasonable estimate of the probable Cost of the Work upon its completion.

§ 5.1.5.3.2 The amount of each progress payment shall then be reduced by:

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232–2019;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232–2019;
- .5 The shortfall, if any, indicated by the Contractor in the documentation required by Section 5.1.5.1 to substantiate prior Applications for Payment, or resulting from errors subsequently discovered by the Owner's auditors in such documentation; and
- .6 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.5.4 The Owner, Construction Manager and Contractor shall agree upon a mutually acceptable procedure for review and approval of payments to Subcontractors and the percentage of retainage held on Subcontracts, and the Contractor shall execute subcontracts in accordance with those agreements.

§ 5.1.5.5 In taking action on the Contractor's Applications for Payment, the Construction Manager and Architect shall be entitled to rely on the accuracy and completeness of the information furnished by the Contractor, and such action shall not be deemed to be a representation that (1) the Construction Manager and Architect have made a detailed examination, audit or arithmetic verification of the documentation submitted in accordance with Article 5 or other supporting data; (2) that the Construction Manager and Architect have made exhaustive or continuous on-site inspections; or (3) that the Construction Manager and Architect have made examinations to ascertain how or for what purposes the Contractor has used amounts previously paid on account of the Contract. Such examinations, audits and verifications, if required by the Owner, will be performed by the Owner's auditors acting in the sole interest of the Owner.

§ 5.1.5.6 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

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§ 5.1.5.7 If final completion of the Work is materially delayed through no fault of the Contractor, then the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A232-2019.

§ 5.1.6 Progress Payments Where the Contract Sum is Based on the Cost of the Work with a Guaranteed Maximum Price

§ 5.1.6.1 With each Application for Payment, the Contractor shall submit payrolls, petty cash accounts, receipted invoices or invoices with check vouchers attached, and any other evidence required by the Owner, Construction Manager or Architect to demonstrate that payments already made by the Contractor on account of the Cost of the Work equal or exceed progress payments already received by the Contractor plus payrolls for the period covered by the present Application for Payment, less that portion of the progress payments attributable to the Contractor's Fee.

§ 5.1.6.2 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Guaranteed Maximum Price among: (1) the various portions of the Work; (2) any contingency for costs that are included in the Guaranteed Maximum Price but not otherwise allocated to another line item or included in a Change Order; and (3) the Contractor's Fee.

§ 5.1.6.2.1 The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Construction Manager and Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.6.2.2 The allocation of the Guaranteed Maximum Price under this Section 5.1.6.2 shall not constitute a separate guaranteed maximum price for the Cost of the Work of each individual line item in the schedule of values.

§ 5.1.6.2.3 When the Contractor allocates costs from a contingency to another line item in the schedule of values, the Contractor shall submit supporting documentation to the Architect and Construction Manager.

§ 5.1.6.3 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment. The percentage of completion shall be the lesser of (1) the percentage of that portion of the Work which has actually been completed; or (2) the percentage obtained by dividing (a) the expense that has actually been incurred by the Contractor on account of that portion of the Work and for which the Contractor has made payment or intends to make payment prior to the next Application for Payment by (b) the share of the Guaranteed Maximum Price allocated to that portion of the Work in the schedule of values.

§ 5.1.6.4 In accordance with AIA Document A232-2019, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.4.1 The amount of each progress payment shall first include:

- .1 That portion of the Guaranteed Maximum Price properly allocable to completed Work as determined by multiplying the percentage of completion of each portion of the Work by the share of the Guaranteed Maximum Price allocated to that portion of the Work in the most recent schedule of values;
- .2 That portion of the Guaranteed Maximum Price properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction or, if approved in writing in advance by the Owner, suitably stored off the site at a location agreed upon in writing;
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified; and
- .4 The Contractor's Fee, computed upon the Cost of the Work described in the preceding Sections 5.1.6.4.1.1 and 5.1.6.4.1.2 at the rate stated in Section 4.4.2 or, if the Contractor's Fee is stated as a fixed sum in that Section, an amount that bears the same ratio to that fixed-sum fee as the Cost of the Work included in Sections 5.1.6.4.1.1 and 5.1.6.4.1.2 bears to a reasonable estimate of the probable Cost of the Work upon its completion.

§ 5.1.6.4.2 The amount of each progress payment shall then be reduced by:

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232-2019;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

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- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232-2019;
- .5 The shortfall, if any, indicated by the Contractor in the documentation required by Section 5.1.6.1 to substantiate prior Applications for Payment, or resulting from errors subsequently discovered by the Owner's auditors in such documentation; and
- .6 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.6.5 The Owner and the Contractor shall agree upon a mutually acceptable procedure for review and approval of payments to Subcontractors and the percentage of retainage held on Subcontracts, and the Contractor shall execute subcontracts in accordance with those agreements.

§ 5.1.6.6 In taking action on the Contractor's Applications for Payment, the Construction Manager and Architect shall be entitled to rely on the accuracy and completeness of the information furnished by the Contractor and such action shall not be deemed to be a representation that (1) the Construction Manager or Architect have made a detailed examination, audit, or arithmetic verification of the documentation submitted in accordance with Section 5.1.6.1 or other supporting data; (2) that the Construction Manager or Architect have made exhaustive or continuous on-site inspections; or (3) that the Construction Manager or Architect have made examinations to ascertain how or for what purposes the Contractor has used amounts previously paid on account of the Contract. Such examinations, audits, and verifications, if required by the Owner, will be performed by the Owner's auditors acting in the sole interest of the Owner.

§ 5.1.6.7 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.1.6.8 If final completion of the Work is materially delayed through no fault of the Contractor, then the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A232-2019.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to when the Work of this Contract is substantially complete, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

§ 5.1.7.1.1 The following items are not subject to retainage:

(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:

(If the retainage established in Section 5.1.7.1 is to be modified prior to when the entire Work of this Contract is substantially complete, including modifications for completion of portions of the Work as provided in Section 3.4.2, insert provisions for such modifications.)

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, when the Work of this Contract is substantially complete, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted when the Work of this Contract is substantially complete shall not include retainage as follows:

(Insert any other conditions for release of retainage when the Work of this Contract is substantially complete, or upon Substantial Completion of the Work of all Contractors on the Project or portions thereof.)

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§ 5.2 Final Payment

§ 5.2.1 Final Payment Where the Contract Sum is Based on a Stipulated Sum

§ 5.2.1.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A232-2019, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect.

§ 5.2.1.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the final Certificate for Payment or Project Certificate for Payment, or as follows:

§ 5.2.2 Final Payment Where the Contract Sum is Based on the Cost of the Work with or without a Guaranteed Maximum Price

§ 5.2.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A232-2019, and to satisfy other requirements, if any, which extend beyond final payment;
- .2 the Contractor has submitted a final accounting for the Cost of the Work, pursuant to Exhibit B, Determination of the Cost of the Work and a final Application for Payment; and
- .3 a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect in accordance with Exhibit B, Determination of the Cost of the Work.

§ 5.2.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the final Certificate for Payment or Project Certificate for Payment, or as follows:

§ 5.3 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located. *(Insert rate of interest agreed upon, if any.)*

_____ % _____

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as Initial Decision Maker pursuant to Article 15 of AIA Document A232-2019, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.

(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A232-2019, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

- Arbitration pursuant to Article 15 of AIA Document A232-2019.
- Litigation in a court of competent jurisdiction.
- Other: *(Specify)*

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If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 Where the Contract Sum is a Stipulated Sum

§ 7.1.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A232–2019.

§ 7.1.1.1 If the Contract is terminated for the Owner’s convenience in accordance with Article 14 of AIA Document A232–2019, then the Owner shall pay the Contractor a termination fee as follows:
(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner’s convenience.)

§ 7.1.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A232–2019.

§ 7.2 Where the Contract Sum is Based on the Cost of the Work with or without a Guaranteed Maximum Price

§ 7.2.1 Termination

§ 7.2.1.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A232–2019.

§ 7.2.1.2 Termination by the Owner for Cause

§ 7.2.1.2.1 If the Owner terminates the Contract for cause as provided in Article 14 of AIA Document A232–2019, the Owner shall then only pay the Contractor an amount as follows:

- .1 Take the Cost of the Work incurred by the Contractor to the date of termination;
- .2 Add the Contractor’s Fee, computed upon the Cost of the Work to the date of termination at the rate stated in Section 4.3.2 or 4.4.2, as applicable, or, if the Contractor’s Fee is stated as a fixed sum in that Section, an amount that bears the same ratio to that fixed-sum Fee as the Cost of the Work at the time of termination bears to a reasonable estimate of the probable Cost of the Work upon its completion;
- .3 Subtract the aggregate of previous payments made by the Owner; and
- .4 Subtract the costs and damages incurred, or to be incurred, by the Owner under Article 14 of AIA Document A232–2019.

§ 7.2.1.2.2 When the Contract Sum is based on the Cost of the Work with a Guaranteed Maximum Price, if the Owner terminates the Contract for cause as provided in Article 14 of AIA Document A232-2019, the amount, if any, to be paid to the Contractor under Article 14 of AIA Document A232-2019 shall not cause the Guaranteed Maximum Price to be exceeded, nor shall it exceed the amount calculated in Section 7.2.1.2.1.

§ 7.2.1.2.3 The Owner shall also pay the Contractor fair compensation, either by purchase or rental at the election of the Owner, for any equipment owned by the Contractor that the Owner elects to retain and that is not otherwise included in the Cost of the Work under Section 7.2.1.2.1.1. To the extent that the Owner elects to take legal assignment of subcontracts and purchase orders (including rental agreements), the Contractor shall, as a condition of receiving the payments referred to in this Article 7, execute and deliver all such papers and take all such steps, including the legal assignment of such subcontracts and other contractual rights of the Contractor, as the Owner may require for the purpose of fully vesting in the Owner the rights and benefits of the Contractor under such subcontracts or purchase orders. All Subcontracts, purchase orders and rental agreements entered into by the Contractor will contain provisions allowing for assignment to the Owner as described above.

§ 7.2.1.3 Termination by the Owner for Convenience

If the Owner terminates the Contract for convenience in accordance with Article 14 of AIA Document A232–2019, then the Owner shall pay the Contractor a termination fee as follows:

(Insert the amount of or method for determining the fee, if any, payable to the Contractor following a termination for the Owner’s convenience.)

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§ 7.3 Suspension

The Work may be suspended by the Owner as provided in Article 14 of AIA Document A232–2019; in such case, the Contract Sum and Contract Time shall be increased as provided in Article 14 of AIA Document A232–2019, except that the term “profit” shall be understood to mean the Contractor’s Fee as described in Section 4.3.2 or 4.4.2, as applicable, of this Agreement.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A232–2019 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner’s representative:

(Name, address, email address, and other information)

§ 8.3 The Contractor’s representative:

(Name, address, email address, and other information)

§ 8.4 Neither the Owner’s nor the Contractor’s representative shall be changed without ten days’ prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A132™–2019, Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A232–2019, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 8.7 Relationship of the Parties

Where the Contract is based on the Cost of the Work plus the Contractor’s Fee, with or without a Guaranteed Maximum Price, the Contractor accepts the relationship of trust and confidence established by this Agreement and covenants with the Owner to cooperate with the Architect and exercise the Contractor’s skill and judgment in furthering the interests of the Owner; to furnish efficient business administration and supervision; to furnish at all times an adequate supply of workers and materials; and to perform the Work in an expeditious and economical manner consistent with the Owner’s interests. The Owner agrees to furnish and approve, in a timely manner, information required by the Contractor and to make payments to the Contractor in accordance with the requirements of the Contract Documents.

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§ 8.8 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A132™-2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition
- .2 AIA Document A132™-2019, Exhibit A, Insurance and Bonds Exhibit
- .3 AIA Document A232™-2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition
- .4 AIA Document E203™-2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

.5 Drawings

Number	Title	Date
--------	-------	------

.6 Specifications

Section	Title	Date	Pages
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.7 Addenda, if any:

Number	Date	Pages
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Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:

(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

- AIA Document A132™-2019, Exhibit B, Determination of the Cost of the Work
- AIA Document E235™-2019, Sustainable Projects Exhibit, Construction Manager as Adviser Edition, dated as indicated below:
(Insert the date of the E235-2019 incorporated into this Agreement.)

Init.

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The Sustainability Plan:

Title	Date	Pages
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Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
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.9 Other documents, if any, listed below:

(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A232-2019 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

This Agreement is entered into as of the day and year first written above.

OWNER (Signature)

CONTRACTOR (Signature)

(Printed name and title)

(Printed name and title)

Init.

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END OF SECTION

PART 1 GENERAL

1.01 The "General Conditions of the Contract for Construction, Construction Management Edition," the American Institute of Architects, AIA Document A232 – 2019 Edition, Articles 1 through 15, pages 1 through 36, is hereby made a part of the Specification.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION

 **AIA® Document A232™ – 2019****General Conditions of the Contract for Construction, Construction Manager as Adviser Edition****for the following PROJECT:***(Name, and location or address)***THE CONSTRUCTION MANAGER:***(Name, legal status, and address)***THE OWNER:***(Name, legal status, and address)***THE ARCHITECT:***(Name, legal status, and address)***ADDITIONS AND DELETIONS:**

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This document is intended to be used in conjunction with AIA Documents A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition; B132™–2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™–2019, Standard Form of Agreement Between Owner and Construction Manager as Adviser.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents. The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract. The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and the Construction Manager or the Construction Manager's consultants, (3) between the Owner and the Architect or the Architect's consultants, (4) between the Contractor and the Construction Manager or the Construction Manager's consultants, (5) between the Owner and a Subcontractor or Sub-subcontractor (6) between the Construction Manager and the Architect, or (7) between any persons or entities other than the Owner and Contractor. The Construction Manager and Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of their duties.

§ 1.1.3 The Work. The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project. The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by other Contractors, and by the Owner's own forces and Separate Contractors.

§ 1.1.5 Contractors. Contractors are persons or entities, other than the Contractor or Separate Contractors, who perform Work under contracts with the Owner that are administered by the Architect and Construction Manager.

§ 1.1.6 Separate Contractors. Separate Contractors are persons or entities who perform construction under separate contracts with the Owner not administered by the Architect and Construction Manager.

§ 1.1.7 The Drawings. The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.8 The Specifications. The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.9 Instruments of Service. Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.10 Initial Decision Maker. The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™-2013, Building

Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™-2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™-2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Construction Manager and the Architect do not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work, and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements,

assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities. Unless otherwise provided under the Contract Documents, the Owner, assisted by the Construction Manager, shall secure and pay for the building permit.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 The Owner shall retain a construction manager adviser lawfully practicing construction management in the jurisdiction where the Project is located. That person or entity is identified as the Construction Manager in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.4 If the employment of the Construction Manager or Architect terminates, the Owner shall employ a successor construction manager or architect to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Construction Manager or Architect, respectively.

§ 2.3.5 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.6 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.7 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3.8 The Owner shall forward all communications to the Contractor through the Construction Manager. Other communication shall be made as set forth in Section 4.2.6.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to review by the Construction Manager and prior approval of the Architect, and the Construction Manager or Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Construction Manager's and Architect's and their respective consultants' additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction

where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Construction Manager or Architect in their administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.5, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Construction Manager and Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information submitted to the Construction Manager in such form as the Construction Manager and Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Construction Manager and Architect any nonconformity discovered by or made known to the Contractor as a request for information submitted to Construction Manager in such form as the Construction Manager and Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner, the Construction Manager, and the Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. The Construction Manager shall review the proposed alternative for sequencing, constructability, and coordination impacts on the other Contractors. Unless the Architect or the Construction Manager objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of the Project already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect, in consultation with the Construction Manager, and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner, Construction Manager, and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Construction Manager or Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work or portions thereof provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices, and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Owner, assisted by the Construction Manager, shall secure and pay for the building permit. The Contractor shall secure and pay for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 **Concealed or Unknown Conditions.** If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or

(2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner, Construction Manager, and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect and Construction Manager will promptly investigate such conditions and, if the Architect, in consultation with the Construction Manager, determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect, in consultation with the Construction Manager, determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner, Construction Manager, and Contractor, stating the reasons. If the Owner or Contractor disputes the Architect's determination or recommendation, either party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner, Construction Manager, and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents:

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect, through the Construction Manager, of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Construction Manager may notify the Contractor, stating whether the Owner, the Construction Manager, or the Architect (1) has reasonable objection to the proposed superintendent or (2) require additional time for review. Failure of the Construction Manager to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner, Construction Manager, or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information, and the Construction Manager's use in developing the Project schedule, a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project. The Contractor shall cooperate with the Construction Manager in scheduling and performing the Contractor's Work to avoid conflict with, and as to cause no delay in, the work or activities of other Contractors, or the construction or operations of the Owner's own forces or Separate Contractors.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Construction Manager's and Architect's approval. The Architect and Construction Manager's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Construction Manager and Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall participate with other Contractors, the Construction Manager, and the Owner in reviewing and coordinating all schedules for incorporation into the Project schedule that is prepared by the Construction Manager. The Contractor shall make revisions to the construction schedule and submittal schedule as deemed necessary by the Construction Manager to conform to the Project schedule.

§ 3.10.4 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner, Construction Manager, and Architect, and incorporated into the approved Project schedule.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Construction Manager, Architect, and Owner, and delivered to the Construction Manager for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data, and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect and Construction Manager is subject to the limitations of Sections 4.2.10 through 4.2.12. Informational submittals upon which the Construction Manager and Architect are not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Construction Manager or Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Construction Manager, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract

Documents, in accordance with the Project submittal schedule approved by the Construction Manager and Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of other Contractors, Separate Contractors, or the Owner's own forces. The Contractor shall cooperate with the Construction Manager in the coordination of the Contractor's Shop Drawings, Product Data, Samples, and similar submittals with related documents submitted by other Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner, Construction Manager, and Architect, that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been reviewed and approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Construction Manager and Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Construction Manager and Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner, the Architect, and the Construction Manager shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Construction Manager shall review submittals for sequencing, constructability, and coordination impacts on other Contractors.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Construction Manager and Architect at the time and in the form specified by the Architect.

§ 3.13 Use of Site

§ 3.13.1 The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.13.2 The Contractor shall coordinate the Contractor's operations with, and secure the approval of, the Construction Manager before using any portion of the site.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner, Separate Contractors, or of other Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner, Separate Contractors, or by other Contractors except with written consent of the Construction Manager, Owner, and such other Contractors or Separate Contractors. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Separate Contractors, other Contractors, or the Owner, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner, or Construction Manager with the Owner's approval, may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner, Construction Manager, and Architect with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner, Construction Manager, and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner, Architect, or Construction Manager. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect through the Construction Manager.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Construction Manager, Architect, Construction Manager's and Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 4 ARCHITECT AND CONSTRUCTION MANAGER

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 The Construction Manager is the person or entity retained by the Owner pursuant to Section 2.3.3 and identified as such in the Agreement.

§ 4.1.3 Duties, responsibilities, and limitations of authority of the Construction Manager and Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Construction Manager, Architect, and Contractor. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Construction Manager and Architect will provide administration of the Contract as described in the Contract Documents and will be the Owner's representatives during construction until the date the Architect issues the final Certificate for Payment. The Construction Manager and Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. On the basis of the site visits, the Architect will keep the Owner and the Construction Manager reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner and Construction Manager known deviations from the Contract Documents and defects and deficiencies observed in the Work.

§ 4.2.3 The Construction Manager shall provide one or more representatives who shall be in attendance at the Project site whenever the Work is being performed. The Construction Manager will determine in general if the Work observed is being performed in accordance with the Contract Documents, will keep the Owner and Architect reasonably informed of the progress of the Work, and will promptly report to the Owner and Architect known deviations from the Contract Documents and the most recent Project schedule, and defects and deficiencies observed in the Work.

§ 4.2.4 The Construction Manager will schedule and coordinate the activities of the Contractor and other Contractors in accordance with the latest approved Project schedule.

§ 4.2.5 The Construction Manager, except to the extent required by Section 4.2.4, and Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, and neither will be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. Neither the Construction Manager nor the Architect will have control over or charge of, or be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or of any other persons or entities performing portions of the Work.

§ 4.2.6 **Communications.** The Owner shall communicate with the Contractor and the Construction Manager's consultants through the Construction Manager about matters arising out of or relating to the Contract Documents. The Owner and Construction Manager shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Construction Manager otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with other Contractors shall be

through the Construction Manager. Communications by and with the Owner's own forces and Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.7 The Construction Manager and Architect will review and certify all Applications for Payment by the Contractor, in accordance with the provisions of Article 9.

§ 4.2.8 The Architect and Construction Manager have authority to reject Work that does not conform to the Contract Documents, and will notify each other about the rejection. Whenever the Construction Manager considers it necessary or advisable, the Construction Manager will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, upon written authorization of the Owner, whether or not the Work is fabricated, installed or completed. The foregoing authority of the Construction Manager will be subject to the provisions of Sections 4.2.18 through 4.2.20 inclusive, with respect to interpretations and decisions of the Architect. However, neither the Architect's nor the Construction Manager's authority to act under this Section 4.2.8 nor a decision made by either of them in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect or the Construction Manager to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons performing any of the Work.

§ 4.2.9 Utilizing the submittal schedule provided by the Contractor, the Construction Manager shall prepare, and revise as necessary, a Project submittal schedule incorporating information from other Contractors, the Owner, Owner's consultants, Owner's Separate Contractors and vendors, governmental agencies, and participants in the Project under the management of the Construction Manager. The Project submittal schedule and any revisions shall be submitted to the Architect for approval.

§ 4.2.10 The Construction Manager will receive and promptly review for conformance with the submittal requirements of the Contract Documents, all submittals from the Contractor such as Shop Drawings, Product Data, and Samples. Where there are other Contractors, the Construction Manager will also check and coordinate the information contained within each submittal received from the Contractor and other Contractors, and transmit to the Architect those recommended for approval. By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Construction Manager represents to the Owner and Architect that the Construction Manager has reviewed and recommended them for approval. The Construction Manager's actions will be taken in accordance with the Project submittal schedule approved by the Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness while allowing sufficient time to permit adequate review by the Architect.

§ 4.2.11 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Upon the Architect's completed review, the Architect shall transmit its submittal review to the Construction Manager.

§ 4.2.12 Review of the Contractor's submittals by the Construction Manager and Architect is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Construction Manager and Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Construction Manager and Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.13 The Construction Manager will prepare Change Orders and Construction Change Directives.

§ 4.2.14 The Construction Manager and the Architect will take appropriate action on Change Orders or Construction Change Directives in accordance with Article 7, and the Architect will have authority to order minor changes in the Work as provided in Section 7.4. The Architect, in consultation with the Construction Manager, will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.15 Utilizing the documents provided by the Contractor, the Construction Manager will maintain at the site for the Owner one copy of all Contract Documents, approved Shop Drawings, Product Data, Samples, and similar required submittals, in good order and marked currently to record all changes and selections made during construction. These will be available to the Architect and the Contractor, and will be delivered to the Owner upon completion of the Project.

§ 4.2.16 The Construction Manager will assist the Architect in conducting inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion in conjunction with the Architect pursuant to Section 9.8; and receive and forward to the Owner written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10. The Construction Manager will forward to the Architect a final Application and Certificate for Payment or final Project Application and Project Certificate for Payment upon the Contractor's compliance with the requirements of the Contract Documents.

§ 4.2.17 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Construction Manager of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.18 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of the Construction Manager, Owner, or Contractor through the Construction Manager. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.19 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions so rendered in good faith.

§ 4.2.20 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.21 The Construction Manager will receive and review requests for information from the Contractor, and forward each request for information to the Architect, with the Construction Manager's recommendation. The Architect will review and respond in writing, through the Construction Manager, to requests for information about the Contract Documents. The Construction Manager's recommendation and the Architect's response to each request will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include other Contractors or Separate Contractors or the subcontractors of other Contractors or Separate Contractors.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Construction Manager, for review by the Owner, Construction Manager and Architect, of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Construction Manager may notify the Contractor whether the Owner, the Construction Manager or the Architect (1) has reasonable objection to any such proposed person or entity or, (2) requires additional time for review. Failure of the Construction Manager to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner, Construction Manager or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner, Construction Manager or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner, Construction Manager or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner, Construction Manager or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, that the Contractor, by these Contract Documents, assumes toward the Owner, Construction Manager and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner, Construction Manager and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor Contractor or other entity. If the Owner assigns the subcontract to a successor Contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor Contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction with Own Forces and to Award Other Contracts

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When the Owner performs construction or operations with the Owner's own forces or Separate Contractors, the Owner shall provide for coordination of such forces and Separate Contractors with the Work of the Contractor, who shall cooperate with them.

§ 6.1.3 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner's own forces, Separate Contractors, Construction Manager and other Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner's own forces, Separate Contractors or other Contractors, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Construction Manager and Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor or other Contractors that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Construction Manager and the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's or other Contractors' completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractors or other Contractors that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs, including costs that are payable to a Separate Contractors or to other Contractors, because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of delays, improperly timed activities, damage to the Work or defective construction by the Owner's own forces, Separate Contractors, or other Contractors.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction, or to property of the Owner, Separate Contractors, or other Contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner, Separate Contractors, and other Contractors shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, other Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Construction Manager, with notice to the Architect, will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Construction Manager, Architect and Contractor. A Construction Change Directive requires agreement by the Owner, Construction Manager and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

A Change Order is a written instrument prepared by the Construction Manager and signed by the Owner, Construction Manager, Architect, and Contractor, stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Construction Manager and signed by the Owner, Construction Manager and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Construction Manager shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Construction Manager may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Construction Manager and Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Construction Manager of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Construction Manager and Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Construction Manager and Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Construction Manager and Architect determine to be reasonably justified. The interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Construction Manager and Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Construction Manager shall prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Construction Manager and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Construction Manager that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner, Architect, Construction Manager, or an employee of any of them, or of the Owner's own forces, Separate Contractors, or other Contractors; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section

15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts and the Architect, based on the recommendation of the Construction Manager, determines justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Construction Manager, before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Construction Manager and the Architect. This schedule, unless objected to by the Construction Manager or Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. The Construction Manager shall forward to the Architect the Contractor's schedule of values. Any changes to the schedule of values shall be submitted to the Construction Manager and supported by such data to substantiate its accuracy as the Construction Manager and the Architect may require, and unless objected to by the Construction Manager or the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.3 Applications for Payment

§ 9.3.1 At least fifteen days before the date established for each progress payment, the Contractor shall submit to the Construction Manager an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner, Construction Manager or Architect require, such as copies of requisitions, and releases of waivers of lien from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Construction Manager and Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all

Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 Where there is only one Contractor, the Construction Manager will, within seven days after the Construction Manager's receipt of the Contractor's Application for Payment, review the Application, certify the amount the Construction Manager determines is due the Contractor, and forward the Contractor's Application and Certificate for Payment to the Architect. Within seven days after the Architect receives the Contractor's Application for Payment from the Construction Manager, the Architect will either (1) issue to the Owner a Certificate for Payment, in the full amount of the Application for Payment, with a copy to the Construction Manager; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Construction Manager and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Construction Manager and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1. The Construction Manager will promptly forward to the Contractor the Architect's notice of withholding certification.

§ 9.4.2 Where there is more than one Contractor performing portions of the Project, the Construction Manager will, within seven days after the Construction Manager receives all of the Contractors' Applications for Payment: (1) review the Applications and certify the amount the Construction Manager determines is due each of the Contractors; (2) prepare a Summary of Contractors' Applications for Payment by combining information from each Contractor's application with information from similar applications for progress payments from the other Contractors; (3) prepare a Project Application and Certificate for Payment; (4) certify the amount the Construction Manager determines is due all Contractors; and (5) forward the Summary of Contractors' Applications for Payment and Project Application and Certificate for Payment to the Architect.

§ 9.4.2.1 Within seven days after the Architect receives the Project Application and Project Certificate for Payment and the Summary of Contractors' Applications for Payment from the Construction Manager, the Architect will either (1) issue to the Owner a Project Certificate for Payment, with a copy to the Construction Manager; or (2) issue to the Owner a Project Certificate for Payment for such amount as the Architect determines is properly due, and notify the Construction Manager and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Project Application for Payment, and notify the Construction Manager and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1. The Construction Manager will promptly forward the Architect's notice of withholding certification to the Contractors.

§ 9.4.3 The Construction Manager's certification of an Application for Payment or, in the case of more than one Contractor, a Project Application and Certificate for Payment, shall be based upon the Construction Manager's evaluation of the Work and the data in the Application or Applications for Payment. The Construction Manager's certification will constitute a representation that, to the best of the Construction Manager's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is, or Contractors are, entitled to payment in the amount certified.

§ 9.4.4 The Architect's issuance of a Certificate for Payment or, in the case of more than one Contractor, Project Application and Certificate for Payment, shall be based upon the Architect's evaluation of the Work, the recommendation of the Construction Manager, and data in the Application for Payment or Project Application for Payment. The Architect's certification will constitute a representation that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is, or Contractors are, entitled to payment in the amount certified.

§ 9.4.5 The representations made pursuant to Sections 9.4.3 and 9.4.4 are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Construction Manager or Architect.

§ 9.4.6 The issuance of a Certificate for Payment or a Project Certificate for Payment will not be a representation that the Construction Manager or Architect has (1) made exhaustive or continuous on-site inspections to check the quality

or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Construction Manager or Architect may withhold a Certificate for Payment or Project Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Construction Manager's or Architect's opinion the representations to the Owner required by Section 9.4.3 and 9.4.4 cannot be made. If the Construction Manager or Architect is unable to certify payment in the amount of the Application, the Construction Manager will notify the Contractor and Owner as provided in Section 9.4.1 and 9.4.2. If the Contractor, Construction Manager and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment or a Project Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Construction Manager or Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment or Project Certificate for Payment previously issued, to such extent as may be necessary in the Construction Manager's or Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from the acts and omissions described in Section 3.3.2 because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor or other Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect or Construction Manager withholds certification for payment under Section 9.5.1, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Construction Manager, and both will reflect such payment on the next Certificate for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment or Project Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Construction Manager and Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Construction Manager will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Owner, Construction Manager and Architect on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor

fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner, Construction Manager nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Construction Manager and Architect do not issue a Certificate for Payment or a Project Certificate for Payment, through no fault of the Contractor, within fourteen days after the Construction Manager's receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Construction Manager and Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner, Construction Manager and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall notify the Construction Manager, and the Contractor and Construction Manager shall jointly prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the list, the Architect, assisted by the Construction Manager, will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect, assisted by the Construction Manager, to determine Substantial Completion.

§ 9.8.4 When the Architect, assisted by the Construction Manager, determines that the Work of all of the Contractors, or designated portion thereof, is substantially complete, the Construction Manager will prepare, and the Construction

Manager and Architect shall execute, a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor and Construction Manager shall jointly prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect after consultation with the Construction Manager.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Construction Manager, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon completion of the Work, the Contractor shall forward to the Construction Manager a notice that the Work is ready for final inspection and acceptance, and shall also forward to the Construction Manager a final Contractor's Application for Payment. Upon receipt, the Construction Manager shall perform an inspection to confirm the completion of Work of the Contractor. The Construction Manager shall make recommendations to the Architect when the Work of all of the Contractors is ready for final inspection, and shall then forward the Contractors' notices and Application for Payment or Project Application for Payment, to the Architect, who will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Construction Manager and Architect will promptly issue a final Certificate for Payment or Project Certificate for Payment stating that to the best of their knowledge, information and belief, and on the basis of their on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Construction Manager's and Architect's final Certificate for Payment or Project Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect through the Construction Manager (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6), if required by the Owner, other data

establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Construction Manager and Architect so confirm, the Owner shall, upon application by the Contractor and certification by the Construction Manager and Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect through the Construction Manager prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall submit the Contractor's safety program to the Construction Manager for review and coordination with the safety programs of other Contractors. The Construction Manager's responsibilities for review and coordination of safety programs shall not extend to direct control over or charge of the acts or omissions of the Contractors, Subcontractors, agents or employees of the Contractors or Subcontractors, or any other persons performing portions of the Work and not directly employed by the Construction Manager.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor;
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction; and
- .4 construction or operations by the Owner, Separate Contractors, or other Contractors.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2, 10.2.1.3 and 10.2.1.4 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2, 10.2.1.3 and 10.2.1.4. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner, Construction Manager or Architect or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner, Construction Manager and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner, Construction Manager and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor, Construction Manager and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor, the Construction Manager and the Architect will promptly reply to the Owner in writing stating whether or not any of them has reasonable objection to the persons or entities proposed by the Owner. If the Contractor, Construction Manager or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor, the Construction Manager and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Construction Manager, Architect, their consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of

tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Construction Manager and Construction Manager's consultants, and the Architect and Architect's consultants, shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 **Notice of Cancellation or Expiration of Contractor's Required Insurance.** Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice directly to the Owner, and separately to the Construction Manager, of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform both the Contractor and the Construction Manager, separately and in writing, prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice directly to the Contractor, and separately to the Construction Manager, of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Construction Manager and Construction Manager's consultants; (3) the Architect and Architect's consultants; (4) other Contractors and any of their subcontractors, sub-subcontractors, agents, and employees; and (5) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Construction Manager, Construction Manager's consultants, Architect, Architect's consultants, other Contractors, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this Section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor, Architect, and Construction Manager for loss of use of the Owner's property, due to fire or other hazards however caused.

§ 11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Construction Manager, Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Construction Manager, Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Construction Manager's or Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by either, be uncovered for their examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Construction Manager or Architect has not specifically requested to examine prior to its being covered, the Construction Manager or Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Construction Manager or Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion, and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Construction Manager's and Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof, or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner, Construction Manager or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner, Separate Contractors, or other Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Construction Manager, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear

all related costs of tests, inspections, and approvals. The Contractor shall give the Construction Manager and Architect timely notice of when and where tests and inspections are to be made so that the Construction Manager and Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Construction Manager, Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Construction Manager and Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Construction Manager and Architect of when and where tests and inspections are to be made so that the Construction Manager and Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Construction Manager's and Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Construction Manager for transmittal to the Architect.

§ 13.4.5 If the Construction Manager or Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Construction Manager or Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- .3 Because the Construction Manager has not certified or the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner, Construction Manager and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees, or any other persons performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner, Construction Manager and Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, after consultation with the Construction Manager, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Construction Manager's and Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall, upon application, be certified by the Initial Decision Maker after consultation with the Construction Manager, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and the Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent:

- .1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of this Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 **Definition.** A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Construction Manager and Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 **Claims for Additional Cost.** If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.7 **Waiver of Claims for Consequential Damages.** The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties, the Construction Manager, and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days of receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

SUPPLEMENTARY CONDITIONS – CMa Contract 00 73 00

ITEM 1: GENERAL

The following supplements modify, change, delete from or add to the "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION," AIA Document A232-2019 Edition (Formerly A201-CMa – 2009). Where any Article of the General Conditions is modified; or any Paragraph, Subparagraph or Clause thereof is modified or deleted by these Supplementary Conditions, the unaltered provisions of that Article, Paragraph, Subparagraph or Clause shall remain in effect.

The "GENERAL CONDITIONS" and the "SUPPLEMENTARY CONDITIONS" apply to all Work in every division of the Specifications.

ITEM 2: REFER TO ARTICLE 1, GENERAL PROVISIONS:

1.1 BASIC DEFINITIONS

Modify Subparagraph 1.1.1 by replacing the word "Specifications" with the words "Project Manual," and adding the words "post addenda" following the word "addenda."

1.2 EXECUTION, CORRELATION AND INTENT

Add Subparagraph 1.2.4 as follows:

In the case of an inconsistency between Drawings and Specifications, or within either Document not clarified by addendum, the better quality or greater quantity of Work shall be provided in accordance with the Architect-Engineer's interpretation.

1.5 OWNERSHIP AND USE OF ARCHITECT'S DRAWINGS, SPECIFICATIONS AND OTHER DOCUMENTS

Delete Subparagraph 1.7 in its entirety and substitute the following.

1.7.1 Contractor's Use of Instruments of Service in Electronic Format.

1.7.2 The Architect / Engineer may, with the concurrence of the Owner, furnish the Contractor version of Instruments of Service in electronic format. The Contract Documents executed or identified in accordance with Subparagraph 1.1.2 shall prevail in case of the inconsistency with subsequent versions made through inevitable electronic operations involving computers.

1.7.3 The Contractor shall not transfer or reuse Instruments of Service in electronic or machine-readable form without prior written consent of the Architect.

1.7.4 If said Instruments are provided, a waiver and payment of processing fees will be required by the Contractor. Fees are \$300 for the first sheet of a request, plus \$50 for each additional sheet requested. See section 00 50 00, for form.

Delete Subparagraph 1.8 in its entirety.

ITEM 3: REFER TO ARTICLE 2, OWNER:

2.3 INFORMATION AND SERVICES REQUIRED OF THE OWNER

Delete Subparagraph 2.3.7 in its entirety and substitute the following:

- 2.3.7 The Contractor will be furnished one set of Contract Documents. Additional sets will be furnished at the cost of reproduction and postage (non-refundable) per set. Reproducible drawings and partial sets shall not be issued to the Contractor.

ITEM 4: REFER TO ARTICLE 3, CONTRACTOR:

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

Add the following Subparagraph 3.3.4:

- 3.3.4 Management and field Supervision personnel acceptable to the Construction Manager, qualified to supervise, organize and coordinate in proper fashion the activities of the Contractor and his subcontractors on the project shall be provided by the Contractor. The above shall also apply to all subcontractors. Changes in personnel are subject to the approval of the Construction Manager.

3.4 LABOR AND MATERIALS

Add the following Subparagraphs 3.4.4:

- 3.4.4 The Owner and the Architect-Engineer will consider a formal request for the substitution of products in place of those specified provided the requests are received by the Architect-Engineer within 30 (thirty) days after the date of award of contract. Substitution requests affirm that the contractor:

- (a) represents that he has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified and has met all requirements of SUBSTITUTION & PROJECT OPTIONS Section 01 25 00.;
- (b) represents that he will provide the same warranty for the substitution that he would for that specified;
- (c) certifies that the cost data presented is complete and includes all related costs under this Contract but excludes costs under separate contracts, and excludes the Architect-Engineer's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and,
- (d) will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.
- (e) identifies any delay to the schedule for work and any additional inspections or tests which might result from the use of the proposed substitution.
- (f) provides the Owner with a reduction in the bid for each requested substitution.

3.6 TAXES (Coordinate with Owner/CM for sales tax exemptions or exceptions.)

Article 3.6.1: Add the following Subparagraph 3.6.1:

Contractor shall include local, state and federal sales, use and consumer and other similar taxes as required by law in the contract sum. Contractor shall pay all use taxes. Supporting documentation must be in conformance with local State requirements.

3.8 ALLOWANCES

Modify Subparagraph 3.8.2.2 as follows. After "labor, installation costs, "add", except where labor and installation costs are specified to be included in the allowance,"

Add Subparagraph 3.8.4 as follows:

3.8.4 Allowances shall be as indicated in Division 1 - General Requirements of this Document.

3.10 CONTRACTOR'S CONSTRUCTION SCHEDULE

Add Subparagraph 3.10.5 as follows.

3.10.5 Extent of Construction Progress Schedule shall be as required in Division 1 - General Requirements of this Document.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

Add Subparagraph 3.11.2 as follows:

3.11.2 Record Set Documents shall also be maintained as indicated in the General Requirements Division 1.

3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

Add Subparagraph 3.12.6.1 as follows.

3.12.6.1 Contractor is responsible for the complete accuracy of their submittals. Therefore, after the Third (3) submittal (1 original submittal plus 2 resubmittals) the Contractor will be subject to back charges from the Architect/Engineer at a minimum of 2 hours per occurrence.

Add Subparagraph 3.12.11 as follows.

3.12.11 Additional detailed information and requirements in making submittals are described in the General Requirements Division 1.

ITEM 5: REFER TO ARTICLE 5, SUBCONTRACTORS:

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

Add Subparagraph 5.2.1.1 as follows:

5.2.1.1 Not later than 30 days after the date of commencement, the Contractor shall furnish in writing to the Owner through the Construction Manager, with copy to the Architect-Engineer, the name of persons or entities proposed as manufacturers for each of the products identified in the General Requirements (Division 1 of the Specifications) and, where applicable, the name of the installing Subcontractor. Use AIA Document No. G805, LIST OF SUBCONTRACTORS, or other appropriate form.

ITEM 6: REFER TO ARTICLE 7, CHANGES IN THE WORK:

7.2 CHANGE ORDERS

7.2.2 (Replace with the following) "Methods used in determining adjustments to the Contract Sum shall be those listed in Subparagraph 7.3.3

7.3 CONSTRUCTION CHANGE DIRECTIVES

7.3.3 (Add at the end of the sentence.) ", 7.3.3.5 Itemized Breakdown will be used unless other method is specifically determined appropriate by the Architect/CM."
and add the following Subparagraph 7.3.3.5

7.3.3.5 An itemized Breakdown; cost for changes will be required as listed below:

7.3.3.5.1(Add) Change Order Pricing Guidelines

For each change over \$500.00, the Contractor shall furnish a detailed, written Proposal itemized according to these Pricing Guidelines. Any Subcontractor or Material Supplier pricing shall also be itemized according to these Pricing Guidelines. In order to expedite the review and approval process, all Proposals shall be prepared in the categories and in the order listed below:

Labor – All field labor shall be priced at the current base rate, excluding fringe benefits, of the prevailing wage in the Project locality. The payroll is to be based on straight time only and is to include number of hours and rate of pay for each classification of work. If overtime is approved, list only the straight time portion in this item.

Fringes – All established payroll taxes, assessments and fringe benefits on the labor in item 1. This may include, but is not limited to, FICA, Federal and State Unemployment, Liability Insurance, Health and Welfare, Pension Funds, Workers' Compensation and Apprentice Fund. Each of the fringes is to be a separate line item.

Equipment Rentals – All charges for certain non-owned heavy or specialized equipment at up to 100 percent of the documented rental cost. No rental charges will be allowed for hand tools, minor equipment, simple scaffolds, etc. Downtime due to repairs, maintenance and weather delays will not be allowed.

Owned Equipment – All charges for certain owned, heavy or specialized equipment at up to 100 percent of the cost listed by the Associated Equipment Dealers Blue Book. No recovery will be allowed for hand tools, minor equipment, simple scaffolds, etc. The longest period of time that the equipment is to be required for the Work will be the basis for the pricing. Downtime due to repairs, maintenance and weather delays will not be allowed.

Trucking – A reasonable delivery charge or per mile trucking charge for delivery of required materials or equipment. Charges for use of a pickup truck will not be allowed.

Overhead – Includes telephone, telephone charges, facsimile, telegrams, postage, photos, photocopying, hand tools, simple scaffolds (one level high), tool breakage, tool repairs, tool replacement, tool blades, tool bits, home office estimating and expediting, home office clerical and accounting support, home office labor, legal services, travel and parking expenses.

Materials

1. All materials purchased by the Contractor and incorporated into the changed Work, showing costs, quantities, or Unit Prices of all items, as appropriate. Reimbursement or material costs shall only be allowed in the amount of the Contractor's actual cost including any and all discounts, rebates or related credits.
2. One third (33 percent) of the cost of reusable materials for each use, such as formwork lumber, shoring or temporary enclosures.

Miscellaneous – The following items are allowable at the cost of the Work, with no overhead or profit.

1. The cost of extending the Bond and the cost of extending liability, property damage, builder's risk or specialty coverage insurance.

2. The premium portion only for approved overtime (labor and fringes). The straight time portion is included in items 1. and 2.
3. Fees for permits, licenses, inspections, test, etc.

Costs which will not be reimbursed for Change Order Work include the following:

1. Employee Profit Sharing Plans – regardless of how defined or described, the Contractor will pay these charges from Contractor profit and will not be reimbursed.
2. Voluntary Employee Deductions – examples are United Way and U.S. Savings Bonds, etc.

7.3.3.5.2 "The cost of the Contractors overhead and profit on Change Order shall be:"

- A. For extra Work completed by the Contractor with his own labor, a maximum of 15 percent shall be added to items 1., 2., 3., 4., 5., and 7, of Subparagraph 7.3.3.5 as an allowance for overhead and profit.
- B. For extra Work completed by Subcontractors of the Contractor, a maximum of 10 percent shall be added to items 1., 2., 3., 4., 5., and 7. of Subparagraph 7.3.3.5 as an allowance for overhead and profit.

7.3.3.5.3 In Subparagraph 7.3.7, the allowance for the combined overhead and profit included in the total cost to the Owner shall be based on the following:

- A. 7.3.11.1 All quotations for changes, be they additions or deductions, shall be submitted in a complete itemized breakdown form acceptable to Architect-Engineer, using Contract Unit Prices when set forth therein. The value of any and all such additions or deductions shall be determined as set forth in Subparagraph 7, as follows:
- B. 7.3.11.2 The itemized breakdown shall show unit quantities and costs of all labor and materials. Submit all verifying data as necessary or required by Architect-CM to support claims. The burden of proof of cost rests upon the Contractor. Contractor agrees that Owner or Owner's Representative shall have the right, at reasonable times, to inspect and audit the books and records of Contractor to verify the propriety and validity of such costs.
- C. 7.3.11.3 Compute requests for changes, be they additions or deductions, as follows:

(1) For portion of work performed by the Contractor:

Net Cost of Materials	= a
State Sales Tax	= b
Net Placing Cost	= c
Labor Burden	= d
 SUM	 = a+b+c+d
Overhead and Profit	= e (Per 7.3.3.5.2 maximum (a+b+c+d))
Allowable Bond Premium	= f
 CONTRACTOR'S COST	 = a+b+c+d+e+f

7.3.7 (Change the phrase in the first sentence) . . . "a reasonable allowance for overhead and profit" . . .to read . . ."a max. percentage fee as provided in Clause 7.3.3.5.2 for profit and overhead".

- 7.3.8. (Revise the last sentence of Subparagraph 7.3.8 to read as follows) . . . "When both additions and deletions are involved in any one change, the allowance for overhead and profit shall be figured on the basis of net increase only, if any."

ITEM 7: REFER TO ARTICLE 8, TIME:

8.2.3 Add the following subparagraph:

- 8.2.3.1 LIQUIDATED DAMAGES: The Owner will suffer financial damage if the project is not substantially completed on the date mutually agreed upon as set forth in the contract documents. The Contractor (and/or his Surety) shall pay to the Owner the sums hereinafter stipulated as fixed, agreed, and liquidated damages for each calendar day of delay until the Work is Substantially Complete. The amount of Liquidated damages shall be established in the Construction Manager's Bidders Instructions.

ITEM 8: REFER TO ARTICLE 9, PAYMENTS & COMPLETION:

9.2 SCHEDULE OF VALUES

Add the following Subparagraph 9.2.1

- 9.2.1 Provide a value identified as 'Contract Closeout' in the amount of 1% of the total contract value, which will be for the creation, preparation and processing of all contract closeout documents as described in the contract documents.

9.3 APPLICATIONS FOR PAYMENT

Add the following to Subparagraph 9.3.1.

Additional information concerning the format of the Contractor's Application for Payment is specified in the General Requirements Division -1.

Delete Subparagraph 9.3.2 in its entirety and substitute the following.

- 9.3.2 Until the contracted scope of work is 50 percent complete, the Owner will pay 90 percent of the amount due the Contractor on account of Progress Payments for labor, materials, and equipment incorporated into the Work and 90 percent of the amount due for materials or equipment suitably stored on or off site, less such amounts as the Architect-Engineer shall determine for all incomplete work and unsettled claims unless modified by local statutes. No additional funds will be held after the contracted scope of work is 50 percent complete except for amounts as the Architect-Engineer shall determine for all incomplete work and unsettled claims unless modified by local statutes.

ITEM 9: REFER TO ARTICLE 11, INSURANCE & BONDS:

11.1 CONTRACTOR'S INSURANCE AND BONDS

Add the following Subparagraphs 11.1.1.1 through 11.1.1.10

- 11.1.1.1 Claims under workers' compensation, disability benefit and other similar employee benefit acts which are applicable to the Work to be performed including private entities performing Work at the site and exempt from the coverage on account of number of employees or occupation, which entities shall maintain voluntary compensation coverage at the same limits specified for mandatory coverage for duration of the Project;

- 11.1.1.2 Claims for damages because of bodily injury, occupational sickness or disease of the Contractor's employees or persons or entities excluded by statute from the requirements of Clause 11.1.1.1 but required by the Contract Documents to provide the insurance required by that Clause;
- 11.1.1.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- 11.1.1.4 Claims for damages insured by unusual personal injury liability coverage;
- 11.1.1.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- 11.1.1.6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle; and
- 11.1.1.7 Claims for bodily injury or property damage arising out of completed operations; and
- 11.1.1.8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.
- 11.1.1.9 Liability Insurance shall include all major divisions of coverage and be on a comprehensive basis including:
 - (1) Premises Operations (including X, C and U coverage as applicable).
 - (2) Independent Contractor's Protective.
 - (3) Products and Complete Operations.
 - (4) Personal Injury Liability with Employment Exclusion deleted.
 - (5) Contractual, including specified provisions for Contractor's obligation under Paragraph 3.18.
 - (6) Owned, non-owned and hired motor vehicles.
 - (7) Broad Form Property Damage including Completed Operations.
- 11.1.1.10 If the General liability coverage is provided by a Commercial General Liability Policy on a claims-made basis, the policy date or Retroactive Date shall predate the Contract; the termination date of the policy or applicable extended reporting period shall be no earlier than the termination date of coverage required to be maintained after final payment, certified in accordance with Subparagraph 9.10.2.

Add Subparagraph 11.1.2.1 as follows.

- 11.1.2.1 The insurance required by Subparagraph 11.1.1 shall be written for not less than the following limits, or greater if required by law. Work shall not be commenced under any Contract until the Contractor has obtained all insurance required under this heading, nor shall the Contractor allow any subcontractor to commence work under any subcontract until similar insurance required of the subcontractor has been obtained. Nothing under this heading shall be considered as limiting or being inconsistent with the contractor's obligations under the AIA General Conditions of the Contract for Construction.

1. WORKERS' COMPENSATION

- | | |
|---|-----------|
| (a) State | Statutory |
| (b) Applicable Federal (Longshoremen's) | Statutory |
| (c) Employer's Liability Each Accident | \$500,000 |

2. COMMERCIAL GENERAL LIABILITY (Including: Premises-Operations; Independent Contractor's Protective; Products and Completed Operations; Hold- Harmless Coverage; Broad Form Property Damage):
 - (a) Bodily Injury/ Property Damage Per Occurrence \$ 1,000,000
 - (b) Products and Completed Operations to be maintained for one year after final payment.
 - (c) Property Damage Liability Insurance shall include coverage for explosion, collapse and underground hazards.
 - (d) Contractual Liability
 - a. Bodily Injury/ \$ 1,000,000
 - b. Property Damage Per Occurrence \$ 1,000,000
 - (e) Personal Injury, with Employment Exclusion deleted:
Annual Aggregate \$1,000,000
3. COMMERCIAL AUTOMOBILE LIABILITY including owned, non-owned and hired vehicles):
 - (a) Bodily Injury: / Property Damage
 - Each Person \$1,000,000
 - Each Occurrence \$1,000,000
4. Excess Umbrella Liability for contracts in excess of \$500,000 \$1,000,000
5. Aircraft Liability (owned and non-owned) when applicable, with limits proposed by contractor for approval by the owner shall be provided. N/A
6. Watercraft Liability (owned and non-owned) when applicable, with limits proposed by contractor for approval by the owner shall be provided. N/A

Add the following to Subparagraph 11.1.3.

Furnish one copy of each Certificate of Insurance herein required for each copy of the Agreement which shall specifically set forth evidence of all coverage required by Subparagraphs 11.1.1, and 11.1.2. The form of the Certificate shall be AIA G705 Certificate of Insurance. Certificate to include the following verbiage "As to the Workers Compensation and Employers Liability Coverage evidenced herein, subrogation is waived in favor of the Construction Manager, Architect and the Owner of the Project. As to the liability policies, the Construction Manager, Architect and the Owner are additional insureds. Such insurance shall be primary and non-contributory to any other insurance that may be available to the additional insureds." Furnish the Owner copies of any endorsements that are subsequently issued amending coverage of limits.

11.1.2 Delete Subparagraph 11.1.2 and substitute the following:

11.1.2.1 The Contractor shall furnish bonds, as required to meet state bidding laws or as required in the Construction Manager's Instructions to Bidders, covering faithful performance of the contract and payment of obligations arising thereunder per the State mandated amount. Bonds may be obtained through the Contractor's usual source and the value thereof shall be equal to the amount of the contract. See Division - 1 General Requirements of this document for acceptable form of bond.

- 11.1.2.1.1 The Contractor shall deliver the required bonds to the Owner via the Construction Manager along with executed contracts, or if the Work is to be commenced prior thereto in response to a letter of intent, the Contractor shall, prior to the commencement of the Work, submit evidence satisfactory to the Construction Manager that such bonds will be furnished.
- 11.1.2.1.2 The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.
- 11.1.2.1.3 Bonds shall be issued by a Surety and countersigned by a resident agent who is authorized to do business in the State in which the Project is located and against whom the Owner has no reasonable objection. Bonds shall comply with applicable statutes. Where required by law, the Bond shall be filed with proper authorities in the locale in which the project is located, and submitted to the Construction Manager for delivery to the Owner. The beneficiary of the bonds shall be the Owner.

ITEM 10: REFER TO ARTICLE 13, MISCELLANEOUS PROVISIONS:

13.4 TESTS AND INSPECTIONS

Article 13.4.1: Delete and substitute:

The Owner shall provide, or cause to be provided, all testing and inspection, except as otherwise provided by the Contract Documents and those inspection services required to be performed by Local, State or Federal government inspection agencies. The Contractor is to notify the Construction Manager and the Architect-Engineer in writing a minimum of Forty Eight (48) hours before placing any concrete, engineered fill, covering or embedding work, conducting any record tests or other tests and when Local, State, or Federal government inspection agencies tests are scheduled. The Contractor shall maintain a record log on site of all tests performed by Local, State or Federal government inspection agencies. This record log shall be available for the Owner's inspection at all times and shall be turned over to the Owner at the completion of the job.

Add the following:

13.6 PUBLICITY

- 13.6.1 Without exception, no publicity or publicity releases (newspapers, radio, television, advertisements, publications, signs, etc.) shall be used or issued without the Owner's prior review and written approval.

END OF SECTION

DIVISION - 1 GENERAL REQUIREMENTS

- 01 11 00 SUMMARY OF THE WORK
- 01 23 00 ALTERNATES
- 01 25 00 SUBSTITUTIONS AND PRODUCT OPTIONS
- 01 31 13 COORDINATION
- 01 32 16 CONSTRUCTION SCHEDULE
- 01 33 23 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES
- 01 41 00 REGULATORY REQUIREMENTS
- 01 42 16 DEFINITIONS
- 01 45 00 QUALITY CONTROL
- 01 50 00 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS
- 01 54 00 CONSTRUCTION AIDS
- 01 56 23 BARRIERS
- 01 60 00 MATERIALS AND EQUIPMENT
- 01 71 23 FIELD ENGINEERING
- 01 73 29 CUTTING AND PATCHING
- 01 77 00 CONTRACT CLOSEOUT

END OF SECTION

PART 1 GENERAL

1.01 WORK UNDER THIS CONTRACT:

- A. IDENTIFICATION: JOHNSON COUNTY COURT ADDITION & RENOVATION, CLARKSVILLE, AR
- B. CONTRACT DOCUMENTS: Requirements of the work are contained in the Contract Documents and include cross-references to published information which is not necessarily bound within the documents.
 - 1. SUMMARY: The requirements of the contract include but are not limited to the following: The facility is located adjacent to the existing Sheriff's Office and Jail on Porter Industrial Road in Clarksville, Johnson County, Arkansas. An existing wood frame building is located on this site. Demolition will be required within the existing building limits to the point as shown on the drawings. The addition will take place to the south of the existing building.

The public area is separated from the other areas of the facility by an electronically secure entry. Most of the interior of the area is constructed of painted, gypsum board clad walls, acoustical ceiling tile, vinyl tile flooring with carpet in select offices. The exterior walls are prefinished metal wall panels, to match the existing. The walls will be constructed of wood framing and trusses. The roof will consist of asphalt shingles.

1.02 WORK SEQUENCE:

- A. Construction Manager to coordinate and sequence the work with Owner.
- B. Construction Manager to submit sequence of work to Architect and Owner for review.

1.03 CONTRACTOR USE OF PREMISES:

- A. Contractor shall coordinate with Owner via the Construction Manager on all aspects of storage and staging areas.

1.04 CONTRACTOR'S AND/OR SUBCONTRACTOR'S GENERAL DUTIES:

- A. Contractor and/or Subcontractors (as directly related to their portion of the work), except as specifically noted otherwise, shall provide, and pay for:
 - 1. Labor, materials, and equipment.
 - 2. Tools, construction equipment and machinery.
 - 3. Other facilities and services, permanent or temporary, necessary for proper execution and completion of Work.
- B. Pay all legally required sales, use, social security, payroll consumer and/or other taxes.
- C. Secure and pay for, as necessary, for proper execution and completion of his Work and as applicable at time of receipt of Bids:
 - 1. Government fees, inspections, or bonds.
 - 2. Licenses.

3. The Owner, through the Construction Manager is to secure and pay for all building permits required by local building authorities. All other permits, if any required, shall be furnished and paid for by the Contractor for his specific part of the Work.
- D. Give required notices.
- E. Comply with codes, ordinances, rules, regulations, orders, and other legal requirements of public authorities which bear on performance of Work.
- F. Contractor, and/or Subcontractors through their Contractor are to promptly submit written notice to Architect of observed variances of Contract Documents from legal requirements. If the Contractor or Subcontractors observes and does not notify in writing, the Construction Manager and/or Architect through the Construction Manager that any of the Contract Documents are at variance therewith they shall:
 1. Include Modifications to Contract Documents that will adjust for necessary changes.
 2. Assume responsibility for Work known to be contrary to such requirements, without notice.
- G. Enforce strict discipline and good order among employees. Do not employ on work:
 1. Unfit persons.
 2. Persons not skilled in assigned task.

1.05 CONTRACTS

- A. Contracts for this project will be based on a single "Lump Sum" Construction Contract for each Bid Package as directed by the Construction Manager's "Instructions to Bidders and Bid Documents."

1.06 CONTRACTOR'S USE OF ADJACENT PROPERTY

- A. No Contractor and/or Subcontractor on any operation on this project, may enter upon, use or in any way encumber the legal use of adjacent property by the Owners or legal tenants or cause unreasonable inconvenience to their use thereof without the written consent of such Owner or tenant delivered through the Owner.

1.07 CONTRACTOR'S USE OF PREMISES

- A. The Construction Manager's "Instructions to Bidders and Bid Documents" defines the General Work requirements of each bid package in addition to the Drawings and Specifications.
- B. Access to and security of the building must be maintained during the extent of this Contract. Job conditions in coordination with the Construction Manager will determine the exact access routes, however, the Contractor and all Subcontractors are advised that all necessary precautions must be taken to prevent interference with the Construction Manager's operation and security requirements. Contractor shall coordinate all work in this Contract which affects the Construction Manager's operation and security requirements.
- C. Contractor and all Subcontractors shall use and maintain in clean condition, site access roads and/or routes as designated by the Construction Manager. No other access shall be used for materials, vehicles, or men. No other parking areas may be utilized by Contractors or Workmen.
- D. Contractors, Subcontractors and Workmen shall not trespass into existing finished and completed areas of the building without permission of the Construction Manager.
- E. Confine operations at site to areas permitted by:

1. Law
 2. Ordinances
 3. Permits
 4. Contract Documents with Contract "Work Limits."
- F. Do not unreasonably encumber site with materials or equipment. Contractors shall limit their use of the premises for his Subcontractors, work and for storage per Section 01 50 00, to allow for:
1. Work by other Contractors and/or Subcontractors
 2. Owner Occupancy
 3. Public Use
- G. Do not load the structure with weight that will endanger the structure. Verify with Structural Engineer prior to placing materials and equipment.
- H. Assume full responsibility for protection and safekeeping of products stored on premises.
- I. Move any stored products under Contractor's and/or Subcontractors' control which interferes with the operations of the Construction Manager, if and when instructed by the Construction Manager.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION

PART 1 GENERAL

1.01 ALTERNATES:

- A. LISTING, ACCEPTANCE, REQUIREMENTS: Refer to the individual work sections of specifications and other contract documents for requirements of work to be performed as "Alternatives." Refer to Contract for indication of which Alternatives have been accepted or will be considered for acceptance during construction. Accepted Alternatives are in full force and effect, as though included originally in base bid. Each must be completely integrated and coordinated with surrounding work.

1.02 LIST OF ALTERNATES:

- A. Alternate #1 – Replace the asphalt roof on the existing Sherrif's Office and Court Building.
Remove the existing
 1. Remove the existing shingles and any felt/membrane below the shingles.
 2. Install a new waterproofing membrane and shingles as defined in the contract drawings and specifications.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY:

- A. DEFINITIONS & EXPLANATIONS: The Contractor's requests for changes in products, materials and methods of construction specified in the Contract Documents are considered requests for "substitutions" and are subject to requirements of this section. Substitutions will not be considered unless they provide a benefit to the owner in terms of superior product, cost savings or delivery time.
- B. PRODUCT SELECTIONS:
 - 1. SINGLE PRODUCT NAMED: Where "NO SUBSTITUTE" is specified provide only that product.
 - 2. ONE OR MORE PRODUCTS NAMED: Provide one of named products or comply with requirements for gaining approval for a "substitution".
 - 3. COMPLIANCE WITH STANDARDS: Selection of product which complies with Contract Documents and applicable standards is Contractor's option, subject to Architect Engineer's approval.
 - 4. PERFORMANCE REQUIREMENTS: Selection of product which has been tested to show compliance with Contract Documents and indicated performances is Contractor's option, subject to Architect Engineer's approval.
 - 5. PRESCRIPTIVE REQUIREMENTS: Selection of product which has been certified by manufacturer to comply with Contract Documents, and prescriptive requirements, is Contractor's option, subject to Architect Engineer's approval.
 - 6. Where listed as an option, "OR EQUAL" is to be determined by the Architect-Engineer.

1.02 LIMITATIONS FOR MAKING SUBSTITUTIONS:

- A. CONDITIONS: Refer to Supplementary Conditions Section 00 73 00, paragraph 3.4.3. Requests by Contractor will be considered when reasonable, timely, fully documented, and qualifying under following circumstances:
 - 1. Proposal for substitutions must be submitted within 30 days of award of contract. (Exception: Refer to Section 28 01 00 SEC GENERAL for substitution requirements). This shall be in accordance with schedule 00 31 13 and 01 32 16, in such a sequence as to cause no delay in the work or in the work of other contractors. Adequate time shall be allowed for review and approval process as well as product delivery/lead times.
 - 2. Proposal must include all necessary coordination and modifications to design for proper functioning of proposed substitutions and include a waiver of all claims for additional costs.
 - 3. Should a substitution be accepted, and should the substitute material, equipment or installation prove defective per 1.03, A, 8, of this section for the service intended, and within the warranty period, the Contractor shall replace this material or equipment with that originally specified, without cost to the Owner.

1.03 SUBMITTALS

- A. REQUESTS FOR SUBSTITUTIONS: Submit 3 copies of requests for substitutions. Request must include all of the following:
 - 1. Complete product data, drawings, and descriptions of materials and methods.
 - 2. Samples where requested.
 - 3. Detailed comparison on significant qualities for proposed substitution in comparison with original requirements utilizing the attached Project Substitution Form listed below.
 - 4. List, with addresses, and identifying Owners and Architects, of at least 2 projects where proposed substitution has been used previously and successfully in a similar application.

5. Coordination information, indicating every required change in every other element of the work which is affected by the substitution.
 6. A statement of effect substitution will have on the work schedule.
 7. Cost information, including a proposal of net change in Contract (if any).
 8. CERTIFICATION: Certification by Contractor that the proposed substitution will result in total work which is equal to or better than the work originally required by Contract Documents.
- B. ACTION BY ARCHITECT ENGINEER: Within 2 weeks of receipt of Contractor's request for substitution, Architect Engineer will notify the Contractor via the Construction Manager of either acceptance or rejection of proposed substitution, in writing. Rejection will include a statement of reasons for rejection.
- C. If accepted, submit Change Order requests for substitutions which propose a change in either the Contract Sum or Contract Time.

PART 2 PROJECT SUBSTITUTION FORM (REQUIRED) (Next Page)

PROJECT SUBSTITUTION FORM

From: _____ Date: _____

Specification: _____ Section: _____ Page: _____

Specified Product: _____

Specified Manufacturer: _____

Proposed Substitution Product: _____

Proposed Manufacturer: _____ Phone: _____

Address: _____ Website: _____

History: New Product 1-4 years 5-10 years More than 10 years

Reason for not providing specified item: _____

Similar Installation No. 1

Project: _____ Architect: _____

Owner: _____ Date Installed: _____

Proposed substitution affects other parts of Work: No Yes; explain _____

Similar Installation No. 2

Project: _____ Architect: _____

Owner: _____ Date Installed: _____

Proposed substitution affects other parts of Work: No Yes; explain _____

Side by Side Comparison (Provide additional Sheets if necessary)	
Specified Product	Proposed Product

Savings to Owner for accepting substitution: _____ (\$ _____)

Substitution changes Contract Time: No Yes (Add) (Deduct) _____ days

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

PART 3 EXECUTION – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION

COORDINATION 01 31 13

PART 1 GENERAL

1.01 SUMMARY:

- A. GENERAL DESCRIPTION: Minimum administrative and supervisory requirements necessary by each Contractor for coordination of work on the project include but are not necessarily limited to the following:
1. Coordination and meetings.
 2. Administrative and supervisory personnel.
 3. Limitations for use of site.
 4. Special reports.
 5. General installation provisions.
 6. Cleaning and protection.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 PROGRESS MEETING:

- A. The Construction Manager will conduct general progress meetings monthly with times coordinated with preparation of payment requests. Every entity then involved in the work is required to be properly represented at each meeting. Included also are (when applicable) each Trade Contractor, the Owner, the Architect-Engineer, consultant, and any others with an interest or expertise in the progress of the work.
1. Review everything of significance which could affect the progress of the work.
 2. Determine how behind-time work will be expedited, and secure commitments from the entities involved in doing so.
 3. Update progress schedule as required.

1.03 INITIAL PROGRESS MEETING: The Construction Manager will schedule the initial progress meeting, recognized as the "Pre-construction Meeting," for a date not more than 15 working days after the date of notice to proceed. Distribute list of trade contractors and progress schedule.

1.04 REPORTING: Within 3 working days after each progress meeting date, the Construction Manager shall distribute copies of the minutes-of-the-meeting to each entity present and to others who should have been present. Prepare a brief report of the progress of the work since the previous meeting and include with payment requests and with distribution of minutes.

1.05 SCHEDULE UPDATING: If revisions to the progress schedule have been made reissue the schedule concurrently with the minutes of the meeting.

1.06 PREINSTALLATION / PRE-SUBMITTAL MEETINGS: Where required by the Contract Documents the Contractor shall notify the Construction Manager of a minimum of 7 working days prior to such meetings. These meetings will generally require the Architect/Engineer, the Construction Manager, The Contractor's representative, the Manufacturer's representative, and the Owner's representative to be present. Minutes shall be the responsibility of the Contractor and shall be delivered to the Construction Manager for distribution within 3 working days after the meeting.

1.07 COORDINATION AND MEETINGS:

- A. Each Contractor shall prepare a written memorandum on required coordination activities. Include such items as required notices, reports and attendance at meetings. Distribute this

memorandum to each entity performing work at the project site. Prepare a similar memorandum for separate contractors where interfacing of their work is required.

- B. COORDINATION DRAWINGS: Contractor shall prepare and submit to Construction Manager coordination drawings where work by separate entities required fabrication off-site of products and materials which must accurately interface. Coordination drawings shall indicate how work shown by separate shop drawings will interface and shall indicate sequence for installation. Comply with all requirements of the "Submittals" Section, 01 33 23.

1.08 ADMINISTRATIVE/SUPERVISORY PERSONNEL:

- A. Within 5 working days of Notice to Proceed, submit to Construction Manager a listing of Contractor's principal staff assignments and consultants, naming persons and listing their addresses and telephone numbers.
- B. Contractor coordination duties:
1. Coordinate work with the Construction Manager, all Subcontractors and all other Contractors:
 - a) For temporary utilities.
 - b) Throughout this work, it will be required that the Contractor and/or Subcontractors apply their material to or over work, either existing or done by others, and which would affect his work. The coordination of all such work is the responsibility of this Contractor. However, it is the responsibility of each Contractor, Subcontractor or Supplier to comply with this Section and 01 60 00 whether or not it is specifically required, by repeating in his particular section of these specifications.
 2. Coordinate schedule with the Construction Manager, all Contractors and/or Subcontractors.
 - a) Submit schedule for and verify timely deliveries of required submittals, shop drawings, etc. as needed to maintain Construction Schedule and in agreement with Construction Manager.
 - b) Verify timely deliveries of products for installation by his forces or by other trades.
 - c) Verify that labor and materials are adequate to maintain construction schedules with the Construction Manager.
 3. All Contractors and/or Subcontractors receiving items from other Contractors and/or Subcontractors for installation in his work, as specified or as required, shall at his expense, do the following:
 - a) Receive, unload, transport, store, protect and install.
 - b) Inspect all items, at time of receiving from carrier, for all damage, concealed or otherwise.
 - c) Record with the Contractor and Construction Manager the receiving of all items and report any damage immediately after receiving. Failure to do so will make the receiving Contractor and/or Subcontractor responsible for damage, late shipment, short shipment, etc.
 4. All Contractors and/or Subcontractors furnishing items to other Contractors and/or Subcontractors for installation shall:
 - a) Properly schedule delivery using Contractor and/or Subcontractor and Construction Manager.

- b) Deliver at such time and sequence as necessary to not delay the work of the installation Contractor, other Subcontractors or the Construction Manager's overall job schedule.
 - c) Furnish at proper time to meet 4.b above, all instruction and/or drawings necessary for installation and if necessary, his personnel at the job site or installation point, for instruction or supervision.
 - d) Periodically inspect the installation with his personnel at the job site or installation point for conformity to his needs. Report to Contractor any discrepancies.
 - e) Deliver all items F.O.B. job site or point of installation.
 - f) Pay proper sales taxes.
5. Conduct conferences among Subcontractors, the Construction Manager and other concerned parties as necessary to:
- a) Maintain coordination and schedules.
 - b) Resolve matters in dispute.
 - c) The Construction Manager will attend and record the minutes of all meetings.
6. Participate in Project Meetings:
- a) Report progress and Subcontractors' progress.
 - b) Recommend needed changes in schedules.
 - c) The Construction Manager will attend and record the minutes of all meetings.
7. Temporary Utilities:
- a) Coordinate installation, operation and maintenance, to verify compliance with Project requirements and with Contract Documents.
 - b) Verify adequacy of service and maintenance at required locations.
8. Submittals, Shop Drawings, Product Data and Samples:
- a) Prior to submittal to the Construction Manager / Architect, the Contractor is to review for compliance with Contract Documents, apply approval stamp with signature and date.
 - I. Check field dimensions and clearance dimensions.
 - II. Check relation to available space.
 - III. Check anchor bolt settings.
 - IV. Review the effect of any changes on the work of other contracts or trades.
 - V. Check compatibility and space requirements with equipment, materials and/or finishes and work of other trades.
 - VI. Check motor voltages, control characteristics, controls, interlocks, wiring and control diagrams.
9. Coordination Drawings:
- a) Each Contractor at the direction of the Construction Manager is to prepare coordination drawings, to assure coordination of work of, or affected by: precast concrete panel or other offsite fabricated products, ceiling work, plumbing, sprinkler, mechanical, electrical and detention equipment or to resolve conflicts.
 - b) Each Contractor is to provide reviewed copies for all concerned parties and other contractors for coordination, via the Construction Manager.
10. Each Contractor is to verify that he and his Subcontractor maintain accurate Record Documents.
11. Substitutions and Changes:

- a) Each Contractor is to review proposals and requests:
- b) Check for compliance with Contract Documents.
- c) Verify compatibility with work and equipment of other trades.
- d) Each Contractor is to recommend action to Construction Manager/Architect and/or Owner as applicable.

12. Each Contractor is to observe Work for compliance with requirements of Contract Documents.

- a) Maintain list of observed deficiencies and discrepancies.
- b) Promptly report deficiencies to Construction Manager.

13. Each Contractor via the Construction Manager is to assemble documentation for handling of claims or disputes involving the various work trades.

14. Equipment Startup: each Contractor is to:

- a) Check to assure that utilities and specified connections are complete, and that equipment is in operable condition.
- b) Observe test, adjust and balance.
- c) Record results, including time and date of startup and promptly report in writing same to Construction Manager/Architect/Engineer.

15. Inspection of Materials and Equipment; each Contractor is to:

- a) Prior to inspection, check that equipment and materials are clean, repainted as required, tested and operational.
- b) Assist inspector; prepare list of items to be completed or corrected.
- c) Report results to Construction Manager/Architect/Engineer.

16. Each Contractor is to assemble Record Documents and transmit to Construction Manager/Architect in complete form. Do not send data that is not complete.

- a) Each Contractor is to verify and be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work.

17. Each Contractor is to coordinate scheduling, submittals, and work of the various sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

18. Each Contractor is to coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

19. In finished areas, conceal pipes, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

20. Each Contractor having penetrations through the roof system shall provide all necessary flashing (boots) for these penetrations to the Roofing Contractor for installation and coordinate each location as specified in specification section 07 72 00.

1.09 USE OF THE SITE:

- A. Limitations on site usage as well as specific requirements that impact site utilization are indicated on the drawings and by other contract documents. In addition to these limitations

and requirements administer allocation of available space equitably among entities needing both access and space so as to produce the best overall efficiency in performance of the total work of the project. Schedule deliveries so as to minimize space and time requirements for storage of materials and equipment on site.

- B. WASTE MATERIALS: Do not dispose of any waste materials on site, either by burial or by burning.

1.10 SPECIAL REPORTS

- A. REPORTING UNUSUAL EVENTS: List chain of events, persons participating, response by the Contractor's personnel, an evaluation of the results or effects and similar pertinent information. Advise the Construction Manager in advance when such events are known or predictable.
- B. REPORTING ACCIDENTS: Record and document data and actions via the Construction Manager. For this purpose, a significant accident is defined to include events where personal injury is sustained, or property loss of substance is sustained, or where the event posed a significant threat of loss or personal injury.

1.11 PRE-INSTALLATION CONFERENCES:

- A. Hold a pre-installation meeting at the project site well before installation of each unit of work which requires coordination with other work. Installer and representatives of the manufacturers and fabricators who are involved in or affected by that unit of work, and with its coordination or integration with other work that has preceded or will follow shall attend this meeting. Advise the Construction Manager of scheduled meeting dates.

1.12 CLEANING AND PROTECTION:

- A. During handling and installation of work at the project site, clean and protect work in progress and adjoining work on the basis of continuous maintenance. Apply protective covering on installed work where it is required to ensure freedom from damage or deterioration at time of substantial completion.
- B. Clean and perform maintenance on installed work as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION

CONSTRUCTION SCHEDULE 01 32 16

PART 1 GENERAL

1.01 SUMMARY:

- A. See "Construction Manager's Instructions to Bidders and Bid Documents", section 00 11 00, for Schedule and Phasing. Specifics will be determined and adjusted during the construction.
- B. Specific requirements in other sections have precedence over general requirements of this section.

1.02 CONSTRUCTION PROGRESS SCHEDULE AND REPORTS:

- A. Within fifteen (15) working days of date established for "commencement of the work," each contractor shall submit to the Construction Manager a comprehensive bar-chart type progress schedule indicating a time bar for each significant category or unit of work to be performed at the site. The major deadlines in this schedule shall correspond to the schedule provided by the Construction Manager. Arrange schedule to indicate required sequencing of units, the Contractor is to allow time in their scheduling of work for the completion of the work of the other Trade Contractors and to show time allowances for inspections, shop drawing / submittal review and similar time margins.
- B. Show phases of work within each time bar for major elements of work.
- C. The progress schedule shall take into account the weather conditions normally expected at the project site and shall indicate for each month the average number days of precipitation for the past 5 years and the actual number of days incurred, as approved by the Architect-Engineer.
- D. Following initial revision of schedule after Construction Manager and Architect-Engineer's review, print and distribute schedule to entities with a need-to-know responsibility, including 3 copies to the Construction Manager.
- E. At any time, the actual progress falls 5% or more behind the schedule progress, the Contractor shall submit a written statement to the Construction Manager outlining the plan for placing the project back on schedule. Failure to provide this information shall be cause to withhold payment.
- F. Show double cost line with first line showing pre-calculated dollar-volume and space in second line for recording actual dollar-volume of completed work at end of each period scheduled.

1.03 SCHEDULE OF VALUES:

- A. If contract amount is over \$20,000, prepare a schedule of values to show breakdown of contract sum corresponding with payment request breakdown and progress schedule line items. Show dollar value and percent of total for each unit of work scheduled. Submit not less than 7 days prior to first payment request and revise each time schedule is affected by change order or other revisions.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION

REGULATORY REQUIREMENTS 01 41 00

PART 1 GENERAL

1.01 GOVERNING REGULATIONS AUTHORITIES:

- A. GENERAL: Contact governing authorities directly for necessary information and decisions having a bearing on the performance of the work.
- B. APPLICABLE CODES: For the purposes of this Project the codes and regulations that apply include the latest applicable edition, but are not limited to the following:
 - 1. 2012 Arkansas Fire Prevention Code
 - a. Volume I
 - b. Volume II
 - c. Volume III
 - d. Appendix B, C, D
 - 2. 2017 National Electrical Code
 - 3. 2010 Arkansas Mechanical Code
 - 4. 2006 Arkansas Plumbing Code
 - 5. 2006 Arkansas Fuel Gas Code
 - 6. 2009 International Energy Conservation Code
 - 7. Current National Fire Protection Association (NFPA) Code

1.02 INDUSTRY STANDARDS:

- A. GENERAL APPLICABILITY OF STANDARDS: Except where more stringent requirements are written directly into the Contract Documents, applicable standards of the construction industry have the same force and effect (and are made a part of the Contract Documents by reference) as if copied directly into the Contract Documents. Such standards, for example, may include ASTM, ANSI, UL, NEC, OSHA, AASHTO, CE, FS, AWS, ACI, etc.
- B. PUBLICATION DATES: Except as otherwise indicated, where compliance with an industry standard is required, comply with the standard in effect as of the date of the Contract Documents.
- C. COPIES OF STANDARDS: Where needed for proper performance of the work, obtain directly from publication source.

1.03 SUBMITTALS:

- A. PERMITS, LICENSES AND CERTIFICATES: For the Owner's records, submit through the Construction Manager copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and record established in conjunction with compliance with standards and regulations bearing upon the performance of the work.
- B. Each Trade Contractor has 10 days, after execution of their contract with the owner, to submit 3 copies of the companies Safety Program and other safety related information required by Federal, State and Local authorities, including but not limited to OSHA. Submit these to the Construction Manager for distribution of one set to the owner and one set to the Architect.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION

DEFINITIONS 01 42 16

ALL TIME LIMITS stated in the Contract Documents are to the essence of the Contract.

ARCHITECT is used interchangeably with the term Architect-Engineer or the Architect's authorized representative.

ARCHITECT-ENGINEER is SpiritArchitecture Group, LLC, 108 E. Mulberry Street, Collierville, TN, 38017, a design member of SOUTHBUILD, LLC, 108 E. Mulberry Street, Collierville, TN 38017, Telephone 901/457-7688, Fax 901/457-7689.

CHANGE ORDER shall mean the duly accepted authorized and approved order of the Owner instructing the Construction Manager to make changes in the Contract.

COMMISSIONING AUTHORITY(CxA) is the person or entity identified as identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. This entity is hired as a consultant on behalf of the owner.

CONSTRUCTION MANAGER is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "CONSTRUCTION MANAGER" means the Construction Manager or the Construction Manager's authorized representative.

CONTRACT DOCUMENTS consist of the Agreement, the Drawings listed in section 00 01 15 and Project Manual, including all modifications thereof incorporated in the documents before their execution, and accepted elements of the Contractor's Proposal.

CONTRACTOR which is contracted directly to the owner in constructing all or a portion of the work of this project.

DAYS refer to number of calendar days, unless specifically noted otherwise.

EXTRA WORK refers to and includes any work required by the Owner which is in addition to that required by the Contract Documents in their present form; and is as directed by the Architect-Engineer, and/or Construction Manager.

FINAL ACCEPTANCE of the Project is the date when construction is complete, in accordance with the Contract Documents, as modified by any Change Orders agreed to by the parties and certified by the Architect-Engineer by issuance of a "Certificate of Substantial Completion".

FUNCTIONAL PERFORMANCE TESTS (FTP) are tests to operate complete HVAC systems through the various modes of operation.

OWNER is Johnson County, Arkansas and shall be as referring to the Owner, its employees, or its authorized representative(s).

PROJECT refers to the improvements which are the subject of and described in the Contract Documents and mentioned as such in the Agreement.

PROJECT MANAGER/Owner's Agent for this Project is Judge Herman Houston or his authorized representative, identified as such in the Contract Documents.

SHALL means "MUST" at all uses in the contract documents.

SUBCONTRACTOR is a person or organization, or his authorized representative, who has a direct contract with an individual trade Contractor to perform any of the Work at the Project Site.

SUBSTANTIAL COMPLETION of the Project or a specified area of the Project is the date when construction is sufficiently completed, in accordance with the Contract Documents, as modified by any Change Orders agreed to by the parties, so that the Owner can occupy the Project or specified area of the Project for the use for which it was intended.

SURETY is a firm or corporation that has executed as Surety, the Contractor's Performance Bond, securing the performance of the Contract.

TRADE CONTRACTOR which is each individual trade Contractor.

WORK of the Contractor and Subcontractor includes all materials, labor, tools, equipment, apparatus, controls, services, transportation, and related items which are necessary or customarily furnished for proper and complete construction, erection and installation of all materials, equipment and systems indicated on Drawings and described in the Project Manual.

WRITTEN NOTICE shall be deemed to have been given if delivered in person to the individual or corporate office designated in writing by each party or sent by certified mail to the last business address known to the party giving the notice.

END OF SECTION

QUALITY CONTROL 01 45 00

PART 1 GENERAL

1.01 DESCRIPTION OF REQUIREMENTS:

- A. DEFINITIONS: Specific quality control requirements for the Work are indicated throughout the Contract Documents. The term "Quality Control" includes, but is not necessarily limited to, inspection, testing, certification, and associated requirements.

1.02 RESPONSIBILITY FOR INSPECTION AND TESTS:

- A. The Owner will employ, and pay for, the services of a qualified Independent Testing Laboratory to perform specified services. Employment of the Testing Laboratory shall in no way relieve the Contractor of his obligation to perform Work in accordance with Contract.

1.03 QUALIFICATIONS:

- A. QUALIFICATION OF QUALITY-CONTROL AGENCIES: Engage independent testing laboratories complying with "Recommended Requirements for Independent Laboratory Qualification" as published by American Council of Independent Laboratories and specializing in type(s) of inspections and tests required. Inspections, testing, and reports shall be under the supervision of a qualified and properly registered professional engineer.
- B. Meet basic requirements of ASTM E329-77 "Standard Recommended Practice for Inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as Used in Construction".

1.04 SUBMITTALS:

- A. SPECIFIC SUBMITTALS: Refer to individual specification sections for specific inspection, testing and certification required and submittal requirements.
- B. Promptly submit copies of reports of inspections and tests to the Construction Manager, Architect-Engineer, and Record Documents file. Reports are to include:
 - 1. Date issued.
 - 2. Project Title and number.
 - 3. Testing Laboratory name and address.
 - 4. Name and signature of Inspector.
 - 5. Name, signature, and registration number of Professional Engineer supervising tests.
 - 6. Date of inspection or sampling.
 - 7. Record of temperature and weather.
 - 8. Date of test.
 - 9. Identification of product and specification section.
 - 10. Location in project.
 - 11. Type of inspection or test.
 - 12. Test method used.
 - 13. Analysis and interpretation of tests results where applicable and observations regarding compliance with Contract Documents.
- C. ADDITIONAL COPIES: Where inspection and test reports and certifications are required by governing authorities, provide additional copies as required. Send copies directly from inspection or testing agency to governing authority. It will NOT be the responsibility of the Construction Manager or the Architect-Engineer to submit such copies to the governing authority.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 COORDINATION OF TEST AGENCY WORK:

- A. COORDINATION WITH TESTING AGENCIES: Afford access and reasonable time in construction sequence for inspections and tests to be performed. Cooperate with testing agencies and provide incidental labor and services needed for the removal and delivery of test samples, and for inspections and taking measurements. Provide patching and restoration services where test samples have been removed.
- B. TEST AGENCY RESPONSIBILITIES: Test agencies are not authorized to change or negate requirements of Contract Documents. Require each test agency to coordinate its assigned work with construction schedule and perform its work promptly. Report observations having a bearing on the work to the Construction Manager.

PART 4 SCHEDULES – NOT USED

END OF SECTION

CONSTRUCTION FACILITIES & TEMPORARY CONTROLS 01 50 00

PART 1 GENERAL

1.01 SUMMARY:

- A. GENERAL DESCRIPTION: Minimum temporary facilities to be provided regardless of methods and means selected for performance of the work. Use of alternate temporary facilities or any additional trade related temporary facility controls are the Contractor's responsibility subject to Architect-Engineer's and Construction Manager's acceptance.

1.02 TEMPORARY UTILITIES:

- A. SOURCES: Coordinate and connect with local/municipal services and franchised utility companies where feasible.
- B. INTERRUPTION OF UTILITIES: During construction, where the work involves additional and/or remodeling to existing facilities, the Contractor shall perform the work in such a manner as to inconvenience the Owner as little as possible. Where it is necessary to connect to existing utilities, the shutdown period shall be coordinated with the Owner's schedule of operations and be limited to a minimum. Close coordination of utility interruption is paramount. Coordinate via the Construction Manager in writing.
- C. UTILITY REQUIREMENTS:
 - 1. Temporary Lighting and Power is to be provided by electrical trade contractor.
 - 2. Toilets: Maintain in a sanitary condition at all times, provided by Owner.
- D. HEATING AND COOLING: HVAC units that can be, will be used prior to substantial completion at the direction of the Construction Manager. The HVAC Contractor must provide adequate labor and costs for materials to provide media filters on all return vents and replace the filters in these units at no additional cost to the Owner.

1.03 SECURITY:

- A. LOCKUP AND SECURITY: Each trade is to store materials and equipment in a manner which will prevent theft and vandalism. As construction of building structure progresses, provide temporary security enclosure, doors, and locks as necessary to prevent unauthorized entrance.

1.04 ACCESS ROADS AND PARKING AREAS:

- A. GENERAL: Verify areas available for access, parking, and materials storage before starting work.

1.05 TEMPORARY CONTROLS:

- A. PROTECTION OF EXISTING ON-SITE AND OFF-SITE FACILITIES:
 - 1. Protect from damage, dust, dirt, etc. all on-site or off-site facilities, utilities, streets, curbs, etc. to remain unchanged. If damaged, restore to original state at no expense to Owner.
 - 2. Protect and preserve in operating condition all active utility services that traverse or border the project site. Repair any damage resulting from this work at no expense to the Owner.
- B. PROTECTION OF PROPERTY MARKERS & OFFICIAL DATUM POINTS: Protect from any damage during construction. Remove only if necessary for construction and with approval of Architect-Engineer and Construction Manager.

- C. WATER CONTROL: Maintain site and construction work free of water accumulation or flooding. Do not endanger adjacent properties.
 - D. WIND DAMAGE CONTROL: Provide properly designed and constructed temporary bracing of adequate strength to prevent any damage to project and/or its component parts due to normal or foreseeable excessive wind forces. Replace or repair all damaged portions of project and/or its component parts at no additional cost to Owner.
 - E. DEBRIS CONTROL: Cleanup and remove debris daily or as instructed by the Construction Manager. Dumpster provided by Owner.
 - F. SOIL EROSION: Provide measures to prevent site erosion during construction.
 - G. ENVIRONMENTAL PROTECTION: Establish procedures and provide needed facilities which will protect against environmental problems (pollution of air, water and soil, excessive noise, and similar problems). Review with Architect-Engineer and Construction Manager.
- 1.06 FIELD OFFICES AND SHEDS:
- A. STORAGE SHEDS: Provide as required.
 - B. On completion of the work, or when directed by the Construction Manager, remove from project site.
- 1.07 PROJECT IDENTIFICATION SIGNS:
- A. Any trade contractor signage must be specifically approved by the Construction Manager on behalf of the Owner.
- 1.08 PROTECTION OF INSTALLED WORK BY EACH INSTALLING CONTRACTOR:
- A. Protect installed Work and provide special protection where specified in individual specification sections.
 - B. Provide temporary and removable protection for installed products. Control activity in immediate work area to minimize damage.
 - C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
 - D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
 - E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
 - F. Prohibit traffic from landscaped areas.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION

CONSTRUCTION AIDS 01 54 00

PART 1 GENERAL

- 1.01 MATERIALS AND EQUIPMENT: Materials and equipment may be new or used but must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards. Provide and maintain signs to prevent damage or injury.
- 1.02 Erect and maintain scaffolding, ramps, runways, platforms, guards, rails, stairs and ladders as necessary for this work.
- 1.03 Provide hoists, temporary elevators, lifts, cranes and towers necessary for expediting the handling of materials.
- 1.04 Keep working and storage areas free from water that could cause damage or that would interfere with work. Do not pump or drain water onto adjacent property. Distribute discharge to prevent excessive erosion.
- 1.05 Remove temporary materials and equipment when their use is no longer required. Clean and repair damage caused by temporary installations or use of temporary facilities. Restore permanent facilities used for temporary services to specified condition.
- 1.06 ADDITIONAL CONSTRUCTION AIDS
 - A. CONSTRUCTION MANAGER / OWNER SHALL PROVIDE:
 1. Dumpster (Cleanup by the Contractor)
 2. Portable Uni-Sex Toilets
 - B. CONTRACTOR SHALL PROVIDE:
 1. Cellular telephones or telephones with provisions for long distance calls for the Contractors own use.
 2. Storage and/or office trailers for the Contractor's own use.
 3. Clean-up of own waste materials (Dumpster provided by the Construction Manager / Owner)
 4. Receiving of Materials, Equipment, Etc.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION

BARRIERS 01 56 23

PART 1 GENERAL

- 1.01 Provide and maintain lighted barricades and fences for public protection as required. Protect all vertical shafts with safe, temporary railings and supports. Cover trenches and holes when not in use.
- 1.02 Completely remove barricades, including foundations, when construction has progressed to the point that they are no longer needed, and when approved by the Owner's site supervisor, Construction Manager, or the Architect-Engineer. Clean and repair damage caused by installation.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION

MATERIALS & EQUIPMENT 01 60 00

PART 1 GENERAL

1.01 DEFINITIONS:

- A. DEFINITIONS used in this Article are not intended to change the meaning of other terms.
 - 1. "Products" are items purchased for incorporation in the Work, whether purchased for the project or taken from previously purchased stock. The term "product" includes the terms "material", "equipment", "system", and terms of similar intent.
 - 2. Named products are items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
 - 3. "Materials" are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed or installed to form a part of the Work.
 - 4. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

1.02 PRODUCTS LIST:

- A. GENERAL: Prepare a schedule showing the listing of principal products (by generic names) required for the work. Show proprietary product names and manufacturer names for each product listed. Organize specifications sections and indicate whether "as specified" or "proposed substitution". Indicate for each product on schedule the name of entity who will handle and install product at the project.
- B. SUBMITTAL: Submit 3 copies of product listing schedule prior to first payment request with explanations for variations from requirements.
- C. ARCHITECT-ENGINEER'S ACTION: Architect-Engineer will respond to Contractor in writing, indicating unacceptable selections (if any) with an explanation. Acceptance by Architect-Engineer will not constitute waiver of requirement that products comply with the Contract Documents.

1.03 WARRANTIES (GUARANTEES):

- A. SPECIAL PROJECT WARRANTY (GUARANTEE): Issued by Contractor.
- B. SPECIFIED PRODUCT WARRANTY: Issued by a manufacturer or fabricator, for compliance with requirements in Contract Documents.
- C. COINCIDENTAL PRODUCT WARRANTY: Available on a product incorporated into the work by virtue of manufacturer's publication of warranty without regard for application requirements (non-specified warranty).
- D. WARRANTY OBLIGATIONS: Restore or remove and replace warranted work to its originally specified condition, at such time during warranty as it does not comply with or fulfill the terms of warranty. Restore or remove and replace other work which has been damaged by failure of warranted work, or which must be removed and replaced to gain access to warranted work.
- E. REINSTATEMENT OF WARRANTY: Upon restoration or removal and replacement of warranted work which has failed, reinstate the warranty by issuing a newly executed form, for at least the remaining period of the original warrant but for not less than half original warranty period.
- F. OWNER'S RECOURSE: Warranties and warranty periods do not diminish implied warranties, and do not deprive Owner of actions, rights and remedies otherwise available for Contractor's failure to fulfill the requirements of the Contract Documents. Owner reserves

right to reject coincidental product warranties considered to be conflicting with or detracting from requirements of the Contract Documents.

1.04 PROOF OF COMPLIANCE:

- A. When proofs of compliance for products, materials, and equipment are called for in the Contract Documents, or subsequently requested by the Architect-Engineer, such proofs of compliance shall be furnished by the Contractor in one or more of the following ways:
- B. Certificates of compliance shall be notarized statements from the manufacturer certifying that the materials conform to the respective type, class, or grade of the referenced standards named in the specifications. In the case of stock-labeled products of standard manufacturer which have a record of satisfactory performance in similar work over a period of not less than 5 years, the Architect-Engineer may, at its option, accept a certificate of compliance in lieu of following forms of proof:
 - 1. Mill certificates shall be the manufacturer's certified mill and laboratory certificates.
 - 2. Testing laboratory certificates shall be certificates from a testing laboratory, bureau or agency, certifying that the materials or products, or equipment have been tested within a period acceptable to the Architect-Engineer; they conform to the reference standards named in the specifications; and give the values of each test as called for in the specifications.
 - 3. Report of actual laboratory tests shall be reported results of actual tests of a material, product, or equipment made by a testing laboratory, bureau, or agency approved by the Architect-Engineer. The report shall state the values obtained for each reference standard named in the specifications and shall be submitted to and in such form as approved by the Architect-Engineer.
- C. All costs of any testing of materials and equipment required to establish proof of compliance shall be included in the contract.

1.05 DRAWINGS & SPECIFICATIONS:

- A. Omissions from the drawings or specifications or the mis-description of details of work which are manifestly necessary to carry out the intent of the drawing and specifications, or which are customarily performed, shall not relieve the Contractor from performing such omitted or mis-described details.

1.06 OTHER MATERIALS:

- A. All other materials, not specifically described but required for the complete and proper installation of the work, shall be new, first quality of their respective kinds, and as selected by the Contractor subject to the approval of the Architect-Engineer.

1.07 DELIVERY, STORAGE & HANDLING:

- A. GENERAL: Receive, store, and handle products, materials and equipment in a manner which will prevent loss, deterioration, and damage. Schedule deliveries to minimize long-term storage at project site.
- B. Manufactured materials shall be delivered to job site in their original packages or containers or bundles with manufacturer's name, brand name, grade, UL listing, and other pertinent data clearly marked thereon.

- C. Store in areas where products and materials will not be subjected to moisture, temperature, or humidity extremes.

1.08 INSTALLATION, GENERAL:

- A. Before any specified material or system is installed the Contractor shall report to the Architect-Engineer via the Construction Manager, any problems anticipated by the use of said material or system and receive instructions from him prior to installation.
- B. Comply with latest manufacturers' instructions and recommendations to extent printed information is more detailed or stringent than requirements contained directly in Contract Documents.
- C. Inspect substrate and conditions for installation, and correct unsatisfactory conditions before proceeding. Inspect each product immediately before installation, and do not install damaged or defective products, materials, or equipment. Make field measurements to verify or supplement dimensions indicated in Construction Documents and be responsible for accurate fit or work.
- D. Anchor work securely in place. Isolate non-compatible materials from contact, sufficiently to prevent deterioration.
- E. Mount individual units of work at industry-recognized mounting heights, if not otherwise indicated.
- F. NAMEPLATES: Where needed for operation and maintenance, provide permanent nameplates on equipment, located in inconspicuous places. Do not allow manufacturer's trademarks or similar labels to be placed on products in locations where exposed to view.

1.09 CLEANING & PROTECTION:

- A. GENERAL: At the time each element of the construction is completed (substantially) in each area of the project, clean element to a condition suitable for occupancy and use and restore minor or superficial damage. Replace units and elements which are damaged beyond successful restoration. Clean and restore adjoining surfaces and other work which was soiled or damaged during the installation; replace other work damaged beyond successful restoration. Where the performance of subsequent work could possibly result in damage to the completed unit or element, provide protective covering and other provisions to minimize possible damage.
- B. LIMITING EXPOSURES OF WORK: Ensure that none of the work, whether complete or in process, will be subjected to harmful, dangerous, damaging, or otherwise deleterious exposures during the construction period.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY:

- A. **GENERAL DESCRIPTION:** Working from lines and levels established by the property survey or drawings, establish and maintain benchmarks and other dependable markers to set the lines and levels for the work at each story of construction and elsewhere on the site as needed to properly locate every element of the work of the entire project. Calculate and measure required dimensions as shown. Do not scale the drawings to determine dimensions. Maintain surveyor's log of layout work. Record deviations (if any) from drawing information on existing conditions, and review with Architect-Engineer at time of discovery.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION

CUTTING AND PATCHING 01 73 29

PART 1 GENERAL

- 1.01 STRUCTURAL WORK: Do not cut-and-patch structural work in a manner resulting in a reduction of load-carrying capacity or load/deflection ratio. Submit proposal and request to the Construction Manager who will obtain Architect-Engineer's approval before proceeding with cut-and-patch of structural work.
- 1.02 VISUAL/QUALITY LIMITATIONS: Do not cut-and-patch work exposed to view (exterior and interior) in a manner resulting in noticeable reduction of visual qualities and similar qualities, as judged by Architect-Engineer.
- A. Refinish entire surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection. For an assembly, refinish the entire unit.
- 1.03 LIMITATION ON APPROVALS: Architect-Engineer's approval to proceed with cutting and patching does not waive right to later require removal/replacement of work found to be cut-and-patched in an unsatisfactory manner, as judged by Architect-Engineer.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION

CONTRACT CLOSEOUT 01 77 00

PART 1 GENERAL

1.01 SUMMARY:

- A. GENERAL DESCRIPTION: The provisions of this section apply primarily to the closeout of actual physical work, not to administrative matters. Specific requirements in other sections have precedence over general requirements of this section.

1.02 RECORD DOCUMENTATION:

- A. RECORD DOCUMENTS: Maintain a complete set of the Contract Documents (project manual, prints of contract drawings, and submittals for record mark-up purposes) throughout the contract time. Mark-up "Record Set" during the work to show changes and actual installation conditions to form a complete record for Owner's purposes. Give particular attention to work which will be concealed and difficult to measure and record at a later date, particularly work which may require servicing or replacement during the life of the project. Sign and date each mark-up. Bind prints into sets, with durable covers, appropriately labeled "Record Set". Include approved materials list. Provide these documents on a USB flash drive in indexed pdf form.
- B. MAINTENANCE MANUALS: Provide 2 sets of 3-ring vinyl-covered binders containing required operating/maintenance manuals, properly identified, and indexed. Include detailed parts list, spare parts, warranties, and inspection procedures. Include copy of approved shop drawings for all heating, ventilating, and air conditioning equipment, and all other motorized or operating equipment. Provide these documents on a USB flash drive in indexed pdf form.

1.03 CLOSEOUT REQUIREMENTS:

- A. OPERATION/MAINTENANCE INSTRUCTIONS: Provide on-location instruction to Owner's personnel, sufficient to ensure safe, efficient operation of systems. Provide maintenance instructions for systems and products.
- B. FINAL CLEANING: At closeout time, clean work to normal level for "first class" maintenance/cleaning of building projects. Remove nonpermanent protection and labels, touch-up minor finishes damage, clean or replace filters of mechanical systems, sanitize plumbing/food service facilities, and replace burned-out/dimmed lamps. Produce a "clean" condition as judged by Architect-Engineer.

1.04 PROCEDURES AT SUBSTANTIAL COMPLETION:

- A. Submit executed warranties, workmanship bonds, maintenance agreements, inspection certificates, proofs of compliance, and similar required documentation for specific units of work, enabling Owner's unrestricted occupancy and use.
- B. Submit record documentation, maintenance manuals, tools, spare parts, keys, and similar operation items.
- C. Complete instruction of Owner's operating personnel and start-up systems.
- D. Complete final cleaning and remove temporary facilities and tools.

- E. When Contractor considers the Work is substantially complete, he shall submit written notice to the Construction Manager that the Work, or designated portion thereof, is substantially complete including list of items to be completed or corrected.
- F. Upon receipt of Contractor's request, Construction Manager will either proceed with inspection or advise Contractor of prerequisites not fulfilled. Following initial inspection, Construction Manager will either prepare Certificate of substantial completion or advise Contractor of work which must be performed prior to issuance of Certificate; and repeat inspection when requested and assured that work has been substantially completed. Results of completed inspection will form the "punch-list" for final acceptance.
- G. Should Architect-Engineer perform reinspection's due to failure of Work not complying with the claims of status of completion made by the Contractor, the Architect-Engineer will be compensated for such reinspection's. The amount of compensation due to the Architect-Engineer shall be deducted from final payment to the Contractor.

1.05 PROCEDURES AT FINAL ACCEPTANCE:

- A. REINSPECTION PROCEDURE: Upon receipt of Contractor's notice that work has been completed, including punch-list items Architect-Engineer will reinspect work. Upon completion of reinspection, Architect-Engineer will either recommend final acceptance and final payment or advise Contractor of work not completed or obligations not fulfilled as required for final acceptance. If necessary, the procedure will be repeated.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION

DIVISION - 2 EXISTING CONDITIONS
02 41 00 DEMOLITION

END OF SECTION

DEMOLITION 02 41 00

PART 1 GENERAL

1.01 SUMMARY:

- A. GENERAL DESCRIPTION: Removal and disposal of designated walls, foundations, pavements, concrete, and other structures.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.
- C. REFERENCES – NOT USED

1.02 SUBMITTALS:

- A. PRODUCT DATA – NOT USED
- B. SHOP DRAWINGS – NOT USED
- C. SAMPLES – NOT USED
- D. SCHEDULE: Submit proposed methods and operations of building demolition to the Construction Manager for review prior to start of work.
 - 1. Include in schedule coordination for shut-off, capping and continuation of utility services as required.
 - 2. Provide a detailed sequence of demolition and removal work to ensure uninterrupted progress of the Owner's on-site operations.

1.03 QUALITY ASSURANCE – NOT USED

1.04 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.05 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for GENERAL REQUIREMENTS
- B. PRIOR TO COMMENCEMENT OF SELECTIVE DEMOLITION WORK, inspect areas in which work will be performed. Photograph existing conditions to structure surfaces, equipment or to surrounding properties which could be misconstrued as damage resulting from selective demolition work; file with Construction Manager prior to starting work.

1.06 DELIVERY, STORAGE AND HANDLING – NOT USED

1.07 PREPARATION

- A. JOB CONDITIONS

1. OCCUPANCY: Structures to be demolished will be vacated and discontinued in use prior to start of work.
2. CONDITION OF STRUCTURES: Owner assumes no responsibility for actual condition of structures to be demolished.
 - a) Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner in so far as practicable. However, variations within structure may occur by Owner's removal and salvage operations prior to start of demolition work.
3. PARTIAL REMOVAL: Items of salvageable value to Contractor may be removed from structure as work progresses. Salvaged items must be transported from site as they are removed.
 - a) Storage or sale of removed items on site will not be permitted.
4. EXPLOSIVES: Use of explosives will not be permitted.
5. TRAFFIC: Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
 - 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 if required by governing regulations.
6. ADJACENT AREAS: Prepare adjacent areas to prevent injury, movement or settlement of structures which are to remain.
7. DAMAGE: Promptly repair damage caused to adjacent facilities by demolition operations at no cost to Owner.
8. UTILITY SERVICES: Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations.

1.08 CONSTRUCTION:

A. DEMOLITION

1. Any uncovering of potential asbestos containing material shall immediately be brought to the attention of the Construction Manager, Architect and Owner in writing. Any removal and disposal of materials containing asbestos if encountered during demolition operations shall be abated under the guidelines set by EPA, OSHA, and state and local agencies with jurisdiction.
2. Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.
3. Demolish buildings completely and remove them from site. Use such methods as required to complete work within limitations of governing regulations.
4. Remove foundations of buildings and structures to a depth of not less than one foot below natural ground, except in the construction area where a depth of not less than two feet below subgrade elevations is required.
5. Break up basement floors to prevent water retention.
6. Remove concrete pavement, parking strip, base, curbs, gutters, sidewalks, driveways, etc. and dispose of as follows:
 - a) Dispose of items below subgrade elevations by no more than two feet.
 - b) Break items more than two feet below subgrade elevations into sizes not to exceed two feet in maximum dimension and leave in place unless it interferes with succeeding items of construction.
 - c) Stockpile ballast, gravel bituminous pavement materials when required.

7. Fill basements or cavities left by structure removal within the area of new construction and below subgrade elevation to the level of the surrounding grade and compact in accordance with Section 31 23 00.

1.09 FIELD QUALITY CONTROL:

A. MEASUREMENT AND PAYMENT

1. Measurement of demolition work will not be made.
2. Payment for demolition work shown on the drawings or specified here in shall be by the contract lump sum price.

1.10 ADJUSTING, CLEANING, AND PROTECTION OF WORK

A. DEBRIS REMOVAL

1. Promptly remove demolition debris from site.
2. Obtain permission from applicable regulatory authority for disposal of debris to waste disposal site.
3. Burning of removed materials from demolished structures will not be permitted on site.
4. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations, as directed by Architect-Engineer or governing authorities. Return adjacent areas to condition existing prior to start of work.

B. CLEANING

1. UPON COMPLETION OF DEMOLITION WORK, remove tools, equipment, and demolished materials from site. Remove protections and leave interior areas broom clean.
2. REPAIR demolition performed more than required. Return structures and surfaces to remain in condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

PART 4 SCHEDULES - NOT USED

END OF SECTION

DIVISION - 3 CONCRETE

03 30 00 BUILDING CAST IN PLACE CONCRETE

03 31 00 SITE CAST IN PLACE CONCRETE

03 35 00 CONCRETE FINISHES

03 39 00 CONCRETE HARDENER

END OF SECTION

CAST-IN-PLACE CONCRETE 03 30 00

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 01 77 00 General Requirements for Contract Close-Out

1.02 SECTION INCLUDES

- A. Materials and procedures for cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, finishes, and curing.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Mix Designs: For each concrete mix.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that include all information necessary for complete fabrication and placement of all reinforcing steel and bar supports. Indicate the number, sizes, lengths, and locations of reinforcing steel including material, grade, bar schedules, bent bar diagrams, bar arrangements, splices, mechanical connections; stirrup, tie, and hoop spacings; rebar supports, and dimensions necessary for proper placement, etc. Prepare placing drawings in accordance with ACI 315 including, but not limited to, the following:
 - 1. Foundation Plans: Indicate footings, piers, foundation walls, slabs-on-grade and related reinforced members at scale of 1/8 inch per foot.
 - 2. Sections and Details: Indicate all pertinent construction features and related reinforcing to scale as large as practicable.
 - 3. Reinforcing Supports and Accessories: Indicate the number, size, type, arrangement and quantities required of bar supports in the areas in which they are used. Where indicated, provide bar supports of the type shown. Provide accessory and bar support placing layouts for typical slab panels, joists, and beams.
 - 4. Miscellaneous Items: Indicate openings, depressions and related reinforcing. Draw other reinforced concrete items at sufficient scale to clearly show reinforcing and location.
 - 5. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly and support of formwork.
- D. Reproduction of Contract Documents is not acceptable for use as placing drawings.
- E. Construction Joint Layout: Indicate proposed construction joints required to construct the structure. Location of construction joints is subject to approval of the Architect.

1.04 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each of the following, signed by manufacturers:
1. Form materials and form-release agent.
 2. Reinforcement accessories.
 3. Cementitious materials.
 4. Admixtures.
 5. Waterstops.
 6. Vapor retarders.
 7. Under slab granular mat.
 8. Curing compounds.
 9. Joint-filler strips.
 10. Bonding agent.
 11. Floor and slab treatments.
 12. Repair materials.
- B. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- C. Minutes of pre-installation conference.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mix concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.
- B. Testing Agency Qualifications: An independent agency, acceptable to Architect/Engineer, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1.
 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician – Grade I. Testing Agency Laboratory Supervisor shall be ACI-certified Concrete Laboratory Testing Technician Grade II.
- C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301, "Specifications for Structural Concrete".

2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
 - E. Maintain temperature of cast-in-place concrete at not less than 50°F nor more than 90°F for time period sufficient to assure proper hydration and curing.
 - F. Refer to Part 3 for hot and cold-weather concreting requirements.
 - G. Concrete Testing Service: Owner will engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
 1. Special Inspections: Comply with Statement of Special Inspections.
 - H. Pre-installation Conference:
 1. Arrange conference at Project site with Special Inspector, Testing and Inspection Agency Inspectors, Architect, Engineer, Contractor, concrete and rebar Subcontractors, and ready-mix concrete manufacturer a minimum of one week prior to start of concrete construction.
 2. Review Project conditions and Contract requirements for work.
 3. Review specifications and special inspections.
- 1.06 DELIVERY, STORAGE, AND HANDLING
- A. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 PRODUCTS

2.01 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 1. Plywood, metal, or other approved panel materials.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch minimum, unless noted otherwise.
- D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- E. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

2.02 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615, Grade 60.

- B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706, Grade 60, deformed; required for the following.
 - 1. Bars installed in epoxy adhesive.
 - 2. Welded bars; conform to AWS D 1.4.
 - 3. Special moment frames and special structural walls, as indicated.
- C. Plain Steel Wire: ASTM A1064, as drawn.
- D. Plain Steel Welded Wire Reinforcement: ASTM A1064, plain, fabricated from as-drawn steel wire into flat sheets.

2.03 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar support contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.04 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class F or C.
- B. Normal Weight Aggregates: ASTM C 33 from a single source.
 - 1. Maximum nominal size of coarse aggregate shall not exceed:
 - a. 1/5 the narrowest dimension between sides of forms.
 - b. 1/3 the depth of slabs.
 - c. 3/4 the minimum clear spacing between individual reinforcing bars or wires, bundles of bars, individual tendons, bundled tendons, or ducts.
 - 2. All aggregates for exterior exposed concrete shall be clean crushed limestone with a maximum size of 1".
- C. Lightweight Aggregate: ASTM C 330 from a single source.
- D. Water: ASTM C 94 and potable.

2.05 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those

permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494, Type A.
2. Retarding Admixture: ASTM C 494, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

2.06 WATERSTOPS

- A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.

2.07 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A, not less than 15 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.08 UNDER SLAB GRANULAR MAT

- A. Granular Fill: 4" compacted thickness of free draining, clean, coarse, granular fill.

2.09 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- E. Clear, Solvent-Borne or Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.10 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Reglets: Fabricate reglets of not less than 0.022-inch- thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

- D. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 22 gauge, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.11 CONCRETE MIXES, GENERAL

- A. Prepare design mixes for each type and strength of concrete, proportioned on the basis of laboratory trial mixes or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mix designs based on laboratory trial mixes.
- B. Limit water-soluble, chloride-ion content in hardened concrete in accordance with ACI 301.

2.12 CONCRETE MIXES & PROPORTIONING

Location	Minimum Compressive Strength at 28 days	Maximum Permissible Water/Cementitious Materials Ratio		Slump Limit
		Non Air-Entrained	Air-Entrained	
Footings, Walls, Piers	4,000 psi	0.49	0.44	3" ± 1"
Slabs-on-Grade	4,000 psi	0.49	0.44	3" ± 1"
Exterior Concrete including Walks and Paving	4,000 psi	0.49	0.44	3" ± 1"
All Other Locations	4,000 psi	0.49	0.44	3" ± 1"

- A. Admixtures: Use in accordance with manufacturer's written instructions. Use of all admixtures is subject to Architect's prior approval.
 - 1. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 2. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50°F.
- B. Required Admixtures:
 - 1. All concrete: Water-reducing, high-range water-reducing or plasticizing admixture.
 - 2. Air-entrained concrete: Air-entraining admixture.
 - a. Air Content: 4.5 to 7.0 percent for exterior exposed concrete; 4.5 to 9.0 percent for lightweight concrete. Air content of trowel-finished floors not to exceed 3 percent.
 - 3. Pumped concrete, architectural concrete, fiber-reinforced concrete: High-range water-reducing or plasticizing admixture.
- C. Fly Ash may be substituted for up to 25 percent, by weight, of cement content in mixes.

- D. Maximum concrete slump using high-range water-reducing or plasticizing admixture may be increased to 9 inches.
- E. Lightweight Concrete: Dry Unit Weight not less than 100 lb /cu. ft. or more than 115 lb /cu. ft. as determined by ASTM C 567. Limit shrinkage to 0.03 percent in 28 days.

2.13 FABRICATING REINFORCEMENT

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

2.14 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

2.15 APPLIED FINISHES

- A. Footings: Rough-formed finish
- B. Foundation walls: Rough-formed finish. Where exposed to view, smooth-rubbed finish.
- C. Slabs-on-grade: Trowel finish
- D. Concrete toppings: Trowel finish
- E. Building frame members: Smooth-rubbed finish
- F. Building walls: Non-exposed rough-formed finished with smooth-rubbed finish at exposed areas.
- G. Elevated slabs: Trowel finish top with smooth-rubbed finish underside.

PART 3 EXECUTION

3.01 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch for smooth-formed finished surfaces prominently exposed to public view.
 - 2. Class B, 1/4 inch for surfaces intended to receive plaster, stucco, etc.
 - 3. Class C, 1/2 inch for permanently exposed surfaces where no other finishes are specified.
 - 4. Class D, 1 inch for permanently concealed rough-formed finished surfaces.

- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Unless otherwise noted, chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.02 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. In all locations where brick or concrete block adjoins the concrete structure, install dovetail anchor slots in concrete structure.

3.03 REMOVING AND REUSING FORMS

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

damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 75 percent of its 28-day design compressive strength and for a minimum of 7-days. No superimposed loads are allowed until 100% of design strength.
 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.04 SHORES AND RESHORES

- A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.05 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Install under interior slabs on grade. Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.06 UNDER SLAB GRANULAR MAT

- A. Place granular fill under all slabs on grade within building.
- B. Place granular fill evenly and uniformly to required grade and compact with mechanical equipment.

3.07 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.08 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated.
 - 2. Form keyed joints as indicated. Unless otherwise indicated, embed keys at least 1-1/2 inches into concrete.
 - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans.
 - 4. Unless otherwise indicated, locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 5. Locate vertical joints in walls beside piers integral with walls, near corners, and in concealed locations where possible.
- C. Control Joints in Slabs-on-Grade: Construct control joints to the depths and spacing indicated.
 - 1. Sawed Joints: Sawcut control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut joints as soon as the concrete has hardened sufficiently to prevent dislodgment of aggregates. Complete sawing within 12 hours of placement.

3.09 WATERSTOPS

- A. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.10 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer.
- C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- E. Cold-Weather Concreting: Comply with ACI 306.1.
- F. Hot-Weather Concreting: Comply with ACI 305.1.
- G. Slab Tolerances: Comply with ACI 117.
1. Interior Slabs-on-Grade: Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.
 2. Unshored Elevated Slabs: Specified overall values of flatness, F(F) 20 minimum.
- 3.11 FINISHING FORMED SURFACES
- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view in the finished structure or concealed by other construction.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part Portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white Portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part Portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white Portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.12 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Comply with provisions listed in Section 03 35 00 Concrete Finishes.

3.13 MISCELLANEOUS CONCRETE ITEMS

- A. Equipment Bases and Housekeeping Pads:
 1. Coordinate sizes and locations of concrete bases and pads with actual equipment provided.
 2. Extend bases and pads not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
 3. Connect concrete pads to concrete slabs as indicated.
 4. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
- B. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.14 CONCRETE PROTECTING AND CURING

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

- B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. If finish materials are to be applied to the surface of concrete, follow manufacturer's recommendations to remove membrane curing compound, unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
 - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.15 LIQUID FLOOR TREATMENTS

- A. Sealing Coat: Where indicated, uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete according to Section 03 39 00 Concrete Hardener.

3.16 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semi-rigid joint filler full depth in saw-cut joints and formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.17 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part Portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 5. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.18 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a special inspector and qualified independent testing and inspecting agency to perform field tests and inspections.
1. Special Inspections: Comply with Statement of Special Inspections Schedules for Concrete Construction and Seismic Resistance.
- B. Concrete Tests: Testing of samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, nor less than once for each 150 cu. yd. of concrete, nor less than once for each 5000 sq. ft. of surface area for slabs or walls.
 - a. When frequency of testing provides less than five compressive-strength tests for a given class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five are used.
 2. Slump: ASTM C 143; one test at point of placement for each sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each sample, but not less than one test for each day's pour of each concrete mix.
 4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each sample.
 5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each sample, but not less than one test for each day's pour of each concrete mix.
 6. Compression Test Specimens: ASTM C 31.
 - a. Cast and field cure three sets of two standard cylinder specimens for each sample.

7. Compressive-Strength Tests: ASTM C 39; test one set of two field-cured specimens at 7 days; test one set of two specimens at 28 days; and hold one set of two specimens for testing at 56 days, if needed.
 8. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests and, if needed, 56-day tests.
 9. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.
 10. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 11. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- C. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

END OF SECTION

SITE CAST IN PLACE CONCRETE 03 31 00

PART 1 GENERAL

1.01 SUMMARY:

A. GENERAL DESCRIPTION: This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes. As specified herein and as shown on the drawings. For all non-building locations including but not limited to the following:

1. Concrete Pavement
2. Curbs
3. Curb and Gutter
4. Sidewalks
5. Equipment Pads
6. Transformer Pads
7. Stoops
8. Ramps

B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES: The following references represent good construction practices. They are hereby made a part of this specification but shall be subordinated to drawings and specifications written specifically for this project.

- A. ACI 117-10 "Specifications for Tolerances for Concrete Construction and Materials."
- B. ACI 301-16 "Specification for Structural Concrete. "Sections 1 through 5 and Section 7, "Lightweight Concrete."
- C. ACI 304R-00 "Guide for Measuring, Mixing, Transporting and Placing Concrete."
- D. ACI 305R-10 "Recommended Practice for Hot Weather Concreting."
- E. ACI 306.1-90 "Recommended Practice for Cold Weather Concreting."
- F. ACI SP 66-04 "Detailing Manual."
- G. ACI 318-14 "Building Code Requirements for Reinforced Concrete."
- H. ASTM C33 / C33M "Concrete Aggregates."
- I. ASTM C94 / C94M "Ready Mix Concrete."
- J. ASTM C150 / C150 "Portland Cement."
- K. ASTM C171 "Sheet Material for Curing concrete."
- L. ASTM C260 / C260M-10a "Air-Entraining Admixtures for Concrete."
- M. ASTM C309 "Liquid Membrane-Forming Compounds for Curing Concrete."
- N. ASTM C494 / C494M "Chemical Admixtures for Concrete."

- O. ANSI/ASTM D1751 "Preformed Expansion Joint Fillers for Concrete Paving and Structural construction."
- P. ANSI/ASTM D1752 "Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction."
- Q. FS-HH-F-341 "Resilient Pre-Molded Bituminous Impregnated Fiberboard Units for concrete Paving and Structural Construction"
- R. FS TT-C-800 "Curing Compound, Concrete, for New and Existing Surfaces."
- S. AASHTO M 153 - "Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction."
- T. Portland Cement Association - Design and Control of Concrete Mixtures, 15th Edition, AND Basic Concrete Construction Practices.

1.03 SUBMITTALS:

A. PRODUCT DATA: For each type of product indicated.

- 1. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- 2. Indicate amounts of mixing water to be withheld for later addition at Project site.

B. SHOP DRAWINGS:

- 1. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- 2. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.
- 3. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and installing and removing reshoring.
- 4. Submit for approval, any details which vary from construction documents but are required to conform to local standards.

1.04 QUALITY ASSURANCE

A. QUALIFICATIONS

- 1. Prior to starting concrete operations, the Contractor shall name his source of supply for concrete materials and submit a test design mix along with representative samples and reports of quality tests for approval.

1.05 SYSTEM DESCRIPTION

A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

- 1. OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cement

1. Cement shall be Type 1 conforming to "Standard Specification for portland cement" (ASTM C150 / C150M). All exposed concrete shall be composed of the same brand of cement and aggregate from the same source to the end that all exposed concrete shall have the same color. Fly Ash is not permitted.
2. Aggregates for normal weight concrete shall conform to "Standard Specifications for Concrete Aggregates (ASTM C33 / C33M). All exposed concrete shall have crushed limestone aggregate. Except as permitted elsewhere in this specification, the maximum size of the aggregate shall not be larger than one-fifth of the narrowest dimension between sides of forms, one-third of the depth of slabs, nor three-fourths of the minimum clear spacing between individual reinforcing bars or bundles of bars.

B. CONCRETE MIXTURES

1. Slabs-on-Grade & Concrete Toppings: Proportion normal-weight concrete mixture as follows:
 - a) Minimum Compressive Strength: 4000 psi at 28 days.
 - b) Maximum Water-Cementitious Materials Ratio: 0.48.
 - c) Minimum Cementitious Materials Content: 560 lb/cu. yd.
 - d) Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
 - e) Allowable Air Entrainment: 5 percent, plus or minus 1 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.
- C. Chemical admixtures shall conform to "Standard Specification for Chemical Admixtures for Concrete" (ASTM C494 / C494M). Calcium chloride will not be permitted.
- D. Reinforcing steel shall conform to "Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement" (ASTM A615 / A615M), Grade 60.

2.02 FINISHES

A. Applied Finishes

1. Concrete Pavement – Broom Finish
2. Curbs– Hair Broom Finish
3. Curb and Gutter– Hair Broom Finish
4. Sidewalks– Broom Finish
5. Equipment Pads - Broom Finish
6. Transformer Pads - Broom Finish
7. Stoops - Hair Broom Finish
8. Ramps - Broom Finish

2.03 ACCESSORIES

- A. JOINT FILLERS: Resilient pre-molded bituminous impregnated fiberboard units complying with ASTM D 1751 and FS HH-F-341, Type II, Class A; or AASHTO M 153, Type I.

- B. JOINT SEALERS: Non-priming, pourable, self-leveling polyurethane. Acceptable sealants are:
 - 1. Sonneborn - "Sonolastic Paving Joint Sealant" and "Sonomeric CT 1 & CT 2 Sealant".
 - 2. Tremco - "Vulkem 45SSL", or Woodmont Products - "Chem-Calk 300".
 - 3. Or approved Equal.
- C. Accessories for supporting reinforcing shall be Class D or Class E - Stainless Protected - AISI Grade 430.
- D. Welded Wire Fabric (ASTM A1064 / A1064M).
- E. Forms shall be No. 2 Southern Yellow Pine, EXT-DFPA Plyform and/or metal. Form ties shall be the removable or screw out type, or snap ties with removable cones. Ties shall be adjustable to permit tightening and shall leave no metal within 1½" of concrete surface.
- F. Curing and Sealing Compounds: The compound shall be a clear styrene butadiene type, 30% solids content minimum, and have test data from an independent laboratory indicating a maximum moisture loss of 0.030 grams per sq. cm. when applied at a coverage rate of 300 sq. ft. per gallon. The compound shall be "Super Pliocure" by the Euclid Chemical Company or "Masterseal 66" by Master Builders.

2.04 FABRICATION – NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING – NOT USED

3.03 PREPARATION

- A. JOB CONDITIONS: Proof-roll prepared base material surface to check for unstable areas. The paving work shall begin after any unsuitable areas have been corrected and are ready to receive paving. Compaction testing for the base material shall be completed prior to the placement of the paving.
- B. SURFACE PREPARATIONS: Remove loose material from compacted base material surface to produce a firm, smooth surface immediately before placing concrete.

3.04 CONSTRUCTION

- A. CONSTRUCTION / INSTALLATION

1. INSTALLATION OF FORMS

- a) The design and engineering of form work, as well as its construction, shall be the responsibility of the Contractor. Form lumber shall be of new material, surfaced and sized to thickness to give approximately even surfaces, put together so as to be true to line and level, and of sufficient strength to carry safely the load of concrete, together with a construction live load of not less than 50 lbs. per square foot, stiff enough to prevent any appreciable bulging, sagging, or moving out of position, tight enough to prevent any appreciable loss of mortar, and so designed as to be safely and easily removed. Exposed corners shall be chamfered ¾" unless otherwise noted. Form panels shall be arranged symmetrically in a workmanlike manner.

- b) All unexposed surfaces may have rough lumber forms.
- c) Form material may be re-used with Consultant's approval, to the end that all surfaces match corresponding or adjoining surfaces.
- d) All forms shall be cleaned and lightly oiled before pouring. Oil for forms shall be used according to manufacturer's instructions.

2. INSTALLATION OF REINFORCING

- a) Reinforcing shall be fabricated, cleaned and placed in accordance with Chapter 7 of ACI 318-14.

3. MIXING AND PLACING CONCRETE

- a) Concrete shall be mixed, conveyed and placed in accordance with Chapter 5 of ACI 318-14.
- b) The Contractor shall notify the Engineer/ Architect, Owner's Representative and the testing laboratory at least 48 hours prior to his anticipated concrete pour. No concrete shall be poured until Engineer/ Architect has given his approval.

- 4. BACKFILL: After the concrete has set sufficiently, the spaces in front and back of placed concrete shall be refilled to the required elevation with suitable material which shall be compacted until firm and solid and neatly graded.

B. COORDINATION WITH OTHER WORK

1. REMOVAL OF FORMS

- a) Particular care shall be taken in removing forms from finished, exposed concrete surfaces to the end that such surfaces are not marred or gouged and that the corners and angles are true, sharp and unbroken. No steel spreaders, tie wires, or other metal shall project or be visible on any concrete surface.

3.05 FIELD QUALITY CONTROL

A. Site Tests, Inspection

- 1. The Owner will engage and pay for the services of an independent testing laboratory to perform the services listed below.
 - a) Slump test, ASTM C143 / C143M, shall be taken with every set of cylinders and as often as required to provide the specified consistency of concrete.
 - b) Determine air content with every set of cylinders, ASTM C231 / C231M, or as required.
 - c) Cast and test a set of at least 6 cylinders for each day's pour. Cylinders shall be made and cured, ASTM C31 / C31M, and tested, ASTM C39 / C39M, in accordance with ASTM specifications for control tests. Cylinders shall be tested at 7 and 28 days. The Contractor shall provide a protected space for storage of "field" cylinders which approximates the condition of curing of the concrete being sampled.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

A. PATCHING AND FINISHING CONCRETE SURFACES

- 1. Immediately after removal of forms, all concrete surfaces shall be inspected, and such defects as voids, stone pockets, tie holes, ridges and pour joints, or other irregularities as remain shall be patched or removed while the concrete is green. All patching and resurfacing shall be done in a manner approved by the Owner and all patches shall be kept wet for at least 7 days. Ridges and irregularities shall be ground smooth with

carborundum blocks or finished to match surrounding surfaces. Formed concrete surfaces shall be rubbed on all exposed surfaces.

2. See CONCRETE Finishes - Section 03 35 00 for additional requirements.

B. CURING AND PROTECTION

1. All concrete shall be given protection from injurious action by sun, rain, flowing water, frost, freezing, mechanical injury, and premature drying out.
2. All concrete and cement finishes shall be maintained in a moist condition for at least the first seven days after placing. This may be accomplished by one or more of the following methods:
 - a) Surface remaining in contact with forms.
 - b) Covering with waterproof paper (polyethylene film or equal per ASTM C171) lapped at edges and weighted down securely to prevent the escape of moisture.
 - c) Covering with burlap or cotton mats kept continuously wet.
 - d) Applying the curing compound specified in paragraph 2.03.
3. Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just prior to final inspection.
4. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials.

PART 4 SCHEDULES – NOT USED

END OF SECTION

CONCRETE FINISHES 03 35 00

PART 1 GENERAL

1.01 SUMMARY:

- A. This Section specifies Finishes for All Concrete.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES:

- A. The following references represent good construction practices. They are hereby made a part of this specification but shall be subordinated to drawings and specifications written specifically for this project.
 - 1. ACI 117-10, - Specifications for Tolerances for Concrete Construction and Materials.
 - 2. ACI SP 66-04 - Detailing Manual.
 - 3. Portland Cement Association - Design and Control of Concrete Mixtures, 15th Edition, AND Basic Concrete Construction Practices.

1.03 SUBMITTALS – NOT USED.

1.04 QUALITY ASSURANCE.

- A. Finishing Tolerances: Limit concrete surface irregularities, designated by ACI 347-04 as abrupt or gradual, as follows:
 - 1. "Class A": True plane within 1/8" in ten feet as determined by a ten-foot straightedge placed anywhere on the slab in any direction or smooth-formed finished surfaces.
 - 2. "Class B": True plane within 1/4" in ten feet as determined by a ten-foot straightedge placed anywhere on the slab in any direction or rough-formed finished surfaces.
- B. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

1.05 SYSTEM DESCRIPTION – NOT USED.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS – NOT USED

2.02 FINISHES

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

1. Rough-Formed Finish applies to concrete surfaces not exposed to view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 1. Smooth-Formed Finish applies to concrete surfaces to receive a rubbed finish, to be covered with a coating or covering material applied directly to concrete.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete:
 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 2. Grout Cleaned Finish: Provide if Smooth Rubbed Finish not provided as specified.
 - a) Do not start cleaning operations until all contiguous surfaces to be cleaned are completed and accessible.
 - b) Do not permit cleaning as the work progresses.
 - c) Mix one-part portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout having the consistency of thick paint.
 - d) Substitute white portland cement for part of the gray portland cement as required to produce a color matching the color of surrounding concrete, as determined by a trial patch.
 - e) Wet the surface of the concrete sufficiently to prevent absorption of water from the grout and apply the grout uniformly with brushes or spray gun.
 - f) Immediately after applying the grout, scrub the surface vigorously with a cork float or stone to coat the surface and fill all air bubbles and holes.
 - g) While the grout is still plastic, remove all excess grout by working the surface with a rubber float, sack, or other means.
 - h) After the surface whitens from drying (about 30 minutes at normal temperatures), rub vigorously with clean burlap.
 - i) Keep the surface damp for at least 36 hours after final rubbing.
 3. Cork Floated Finish: Provide as corrective/repair finish. Only where Grout Cleaned Finish does not correct imperfections.
 - a) Remove forms at an early stage, and no later than three days after placement of concrete.
 - b) Remove ties.
 - c) Remove burrs and fins.
 - d) Mix one-part portland cement and one-part fine sand with sufficient water to produce a stiff mortar.
 - e) Dampen the wall surface.
 - f) Apply mortar with a firm rubber float or with a trowel, filling all surface voids.
 - g) Compress mortar into voids using a slow-speed grinder or stone.
 - h) If the mortar surface dries too rapidly to permit proper compacting and finishing, apply a small amount of water with a fog sprayer.
 - i) Produce the final texture with a cork float using a swirling motion.

D. FINISHING FLOORS AND SLABS

1. General: Comply with ACI 302.1R-15 recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
2. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in 1 direction.
3. Apply scratch finish to surfaces to receive concrete floor toppings or to receive mortar setting beds for bonded cementitious floor finishes.
4. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.
5. Apply float finish to surfaces to receive trowel finish.
6. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - a) Apply a trowel finish to surfaces indicated exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 - b) Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-foot- (3.05-m-) long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/4 inch (6 mm).
7. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
 - a) Comply with flatness and levelness tolerances for trowel finished floor surfaces.
8. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 - a) Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

E. SITE CONCRETE FINISHING

1. After striking off and consolidating concrete, smooth surface by screening and floating. Adjust floating to compact surface and produce uniform texture. After floating, test surface for trueness with 10'-0" straightedge. Distribute concrete as required to remove surface irregularities and refloat repaired areas to provide continuous smooth finish.
2. Work edges of sidewalks, gutters, back top edge of integral curb, and formed joints with an edging tool, and round to 1/2" radius. Eliminate tool marks on concrete surface. After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:

- a) Inclined Slab Surfaces: Provide coarse, nonslip finish by scoring surface with stiff-bristled broom perpendicular to line of traffic.
 - b) Curbs, gutters, and walks: Broom finish by drawing fine-hair broom across surface perpendicular to line of traffic. Repeat operation as necessary to produce a fine line texture.
 3. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point up any minor honeycombed areas. Remove and place areas or sections with major defects, as directed.
 4. Protect and cure finished concrete paving using acceptable moisture-curing methods, more particularly described in the "water-curing" section of ACI 308-81.
- F. Unspecified Finish: If the finish of formed surfaces is not specifically called out elsewhere in the Contract Documents, provide the following finishes as applicable.
1. Rough form finish: For all concrete surfaces not exposed to public view.
 2. Smooth form finish: For all concrete surfaces exposed to public view.
- G. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

PART 3 EXECUTION

3.01 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas for approval by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one-part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete, but not less than 1 inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- A. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, pop-outs, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or

that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- B. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- C. Repair materials and installation not specified above may be used, subject to Architect's approval.

PART 4 SCHEDULES – NOT USED

END OF SECTION

CONCRETE HARDENER 03 39 00

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single application cure-seal-hardener for new concrete floors.
- B. Precautions for avoiding staining concrete before and after application.

1.02 REFERENCES: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

- A. ASTM C779 – Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces
- B. ASTM C805 – Standard Test Method for Rebound Number; latest edition.
- C. ASTM C856 - Standard Practice for Petrographic Examination of Hardened Concrete
- D. ASTM D3359 - Standard Test Methods for Rating Adhesion by Tape Test
- E. ASTM F150 - Standard Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 33 23.
- B. Material requirements for concrete to which cure-seal-hardener is to be applied, including cement type, water-cement ratio, type of trowel finish, limitations on admixtures, pigments, bonding agents, and bond breakers, etc.
- C. Product Data: Manufacturer's data sheets, including product specifications, test data, preparation instructions and recommendations, storage and handling requirements and recommendations, and installation methods.
- D. Maintenance instructions, including precautions for avoiding staining after application.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Applicator experienced with installation of product and certified by manufacturer, or applicator experienced with similar products and providing manufacturer's field technician on site to advise on application procedures; and providing adequate number of skilled workers trained and familiar with application requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver product in factory numbered and sealed drums, with numbers recorded for Owner's records.
- B. Store products in manufacturer's unopened drums until ready for installation.

1.06 PROJECT CONDITIONS

- A. No satisfactory procedures are available to remove petroleum or rust stains from concrete. Prevention is therefore essential. Take precautions to prevent staining of concrete prior to application of cure-seal-hardener and for minimum of three months after application:
 - 1. Prohibit parking of vehicles on concrete slab.
 - 2. If vehicles must be temporarily parked on slab, place drop cloths under vehicles during entire time parked.

3. If construction equipment must be used for application, diaper all components that might drip oil, hydraulic fluid, or other liquids.
 4. Prohibit pipe cutting using pipe cutting machinery on concrete slab.
 5. Prohibit temporary placement and storage of steel members on concrete slab.
- B. Do not install products under environmental conditions outside manufacturer's absolute limits.
- C. Do not use frozen material; thaw and agitate prior to use.

1.07 WARRANTY

- A. Provide manufacturer's warranty that a structurally sound concrete surface prepared and treated according to the manufacturer's directions will remain permanently dustproof, hardened and water repellent. If after the specified sealing period the treated surface does not remain dustproof, hardened and water repellent, provide, at manufacturer's expense, sufficient material to reseal defective areas.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
1. Ashford Formula, By Curecrete: <https://ashfordformula.com>.
 2. Armor L3000, by Foundation Armor; <https://www.foundationarmor.com/>
 3. Lithi-Tek 4500, by KereTek industries, Inc.; <https://ghostshieldconcretesealers.com>
 4. Lion Hard, by Laticrete International, Inc.; www.laticrete.com
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 25 00.

2.02 MATERIALS

- A. Cure-Seal-Hardener: Ashford Formula; water-based chemically reactive penetrating sealer and hardener, that seals by densifying concrete so that water molecules cannot pass through, but air and water vapor can, while allowing concrete to achieve full compressive strength, minimizing surface crazing, and eliminating dusting.
1. Colorless, transparent, odorless, non-toxic, non-flammable.
 2. Containing no solvents or volatile organic compounds.
 3. USDA approved for food handling facilities.
 4. Allowing traffic on floors within 2 to 3 hours, with chemical process complete within 3 months.
 5. No change to surface appearance except a sheen developed due to traffic and cleaning.
- B. Water: Clean, potable.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until the substrates have been properly prepared and are suitable for application of product.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. If this is the applicator's first project using this product, provide the manufacturer's technical representative on-site to familiarize installers with proper procedures.
- C. Prevent damage to and soiling of adjacent work.
- D. New Concrete: Apply cure-seal-hardener to new concrete as soon as the concrete is firm enough to work on after troweling, except on colored concrete wait minimum of 30 days.
 - 1. Spray on at rate of 200 square feet per gallon (4.8 sq m/L).
 - 2. Keep surfaces wet with cure-seal-hardener for minimum soak-in period of 30 minutes, without allowing drying out or becoming slippery. In hot weather slipperiness may appear before the 30-minute time period has elapsed. If that occurs, apply more cure-seal-hardener as required to keep entire surface in a non-slippery state for the first 15 minutes. For the remaining 15 minutes, mist the surface as needed with water to keep the material in a non-slippery state.
 - 3. After this period, when treated surface becomes slippery lightly mist with water until slipperiness disappears.
 - 4. Wait for surface to become slippery again and then flush entire surface with water removing all residue of cure-seal-hardener.
 - 5. Squeegee surface completely dry, flushing any remaining slippery areas until no residue remains.
 - 6. Wet vacuum or scrubbing machines may be used to remove residue, provided manufacturer's instructions are followed.

3.04 PROTECTION

- A. Protect installed floors until chemical reaction process is complete; at least three months.
 - 1. Comply with precautions listed under PROJECT CONDITIONS.
 - 2. Clean floor regularly in accordance with manufacturer's recommendations because water will accelerate the sealing and scrubbing will impart a shine.
 - 3. Clean up spills immediately and spot-treat stains with good degreaser or oil emulsifier.
- B. Precautions and cleaning are the responsibility of the General Contractor until Substantial Completion.

PART 4 SCHEDULES – NOT USED

END OF SECTION

JOHNSON COUNTY COURT ADDITION & RENOVATION
CLARKSVILLE, ARKANSAS

24-009A

DIVISION - 5 METALS

05 50 00 MISCELLANEOUS METALS

END OF SECTION

MISCELLANEOUS METALS 05 50 00

PART 1 GENERAL

1.01 SUMMARY:

A. GENERAL DESCRIPTION: Metal fabricated items made from iron and steel shapes, plates, bars, strips, tubes, pipes and castings which are not a part of structural steel or other metal systems specified elsewhere. Miscellaneous sheet metal items custom-fabricated from metal sheets which are not specified in other sections of these specifications.

1. Work under this section shall include but not be limited to:

- a. Rough hardware
- b. Loose Steel Lintels
- c. Steel Pipe Bollards
- d. All miscellaneous metals are to be shop prime painted, unless indicated otherwise.

B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES: Comply with latest edition of the following as applicable unless otherwise specified or modified:

- A. American Welding Society (AWS); Standard Welding Symbols; Standard Code for Welding in Building Construction.
- B. American Society for Testing Materials (ASTM).
- C. American National Standards Institute (ANSI).
- D. Structural Steel Painting Council (SSPC).
- E. Federal Specifications (FS) and Military Specifications (MIL) referenced.

1.03 SUBMITTALS:

A. PRODUCT DATA: Submit producer's or manufacturer's specifications and installation instructions for products used. Include laboratory test reports and other data to show compliance with specifications.

B. SHOP DRAWINGS:

1. Submit shop drawings showing complete details and schedules for fabrication and assembly of miscellaneous metal items including plans, elevations, sections, and details. Show connections and accessory items.
2. Provide templates, and directions for installation of anchor bolts and other anchorages.
3. Where materials or fabrications are indicated to comply with certain requirements for design loadings include structural computations, material properties and other information needed for structural analysis.
4. The Contractor shall submit one blue-line print and one good quality mylar sepia on each shop drawing for review. The checked sepia will be returned to the Contractor who will then run and distribute all copies required. The Contractor shall require all shop drawings to be checked 100% before they are submitted to the Architect-Engineer for review. Failure to do so will result in the shop drawing being returned without any action.
5. Prepare shop drawings and calculations in accordance with the requirements of 1.05, "System Description" as required for stairs and ladders under seal of a licensed professional engineer registered in the state that the facility is located.

1.04 QUALITY ASSURANCE:

- A. SHOP ASSEMBLY: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1.05 SYSTEM DESCRIPTION:

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS/ EQUIPMENT:

A. MATERIALS:

1. METALS: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.

2. STEEL:

- a. STEEL PIPE: ASTM A53 / A53M-12; Type and grade (if applicable) as selected by fabricator and as required for design loading; black finish unless galvanizing is indicated; standard weight (schedule 40), unless otherwise indicated.

- B. EQUIPMENT: Provide closure plate over all cavity spaces such as open ends of pipes and tubes that are exposed to finished areas.

1. 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 of sizes, shapes and dimensions required. Furnish malleable iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

2. LOOSE STEEL LINTELS:

- i. Provide loose structural steel lintels for openings and recesses in masonry walls and partitions as shown. Weld adjoining members together to form a single unit where indicated. Provide not less than 8" bearing at each side of openings, unless otherwise indicated.
- ii. Finish: Shop prime, paint in field.

3. MISCELLANEOUS STEEL TRIM:

- a. Provide shapes and sizes indicated for profiles shown. Except as otherwise indicated, fabricate units from structural steel shapes and plates and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings and anchorages as required for coordination of assembly and installation with other work.
- b. Finish: Shop prime, paint in field.

4. STEEL PIPE BOLLARDS: Formed from steel pipe in size as indicated.

- a. Finish: Shop prime, paint in field finish.

2.02 FINISHES:

- A. METAL PRIMER PAINT: Red lead iron oxide, raw linseed oil, alkyd paint, Steel Structures Painting Council (SSPC) Paint 2-64.

- B. Primer selected must be compatible with finish coats of paint. Coordinate selection of metal primer with finish paint requirements specified in Division 9.
 - C. GALVANIZING REPAIR PAINT: High zinc dust content paint for re-galvanizing welds in galvanized steel, complying with the Military Specifications MIL-P-21035 (Ships).
- 2.03 ACCESSORIES: Provide materials with proven record of compatibility with surfaces contacted in installation.
- A. FASTENERS: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.
 - 1. BOLTS AND NUTS: Regular hexagon head type, ASTM A307-14e1, Grade A.
 - 2. LAG BOLTS: Square head type, ANSI-B18.2.1-2012.
 - 3. MACHINE SCREWS: Cadmium plated steel, FS FF-S-92.
 - 4. WOOD SCREWS: Flat head carbon steel, FS FF-S-111.
 - 5. PLAIN WASHERS: Round, carbon steel, FS FF-W-92.
 - 6. TOGGLE BOLTS: Tumble-wing type, class and style as required.
 - 7. LOCK WASHERS: Helical spring type carbon steel, FS FF-W-84A.
- 2.04 FABRICATION
- A. WORKMANSHIP:
 - 1. Use materials of size and thickness indicated or, if not indicated, as required to produce strength and durability in finished product for use intended. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of work.
 - 2. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32" unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
 - 3. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.
 - 4. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, Phillips flat-head (countersunk) screws or bolts.
 - 5. Provide for anchorage and coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.
 - 6. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.
 - 7. Sheet Metal Fabrications:
 - a. Form sheet metal items in maximum lengths and keep joints to a minimum. Do not expose cut edges of sheet metal except as shown. Fold back exposed ends of unsupported sheet metal to form a 1/2" wide hem on the concealed side or ease exposed edges with backing to a radius of approximately 1/32". Form items with flat, flush surfaces, true to line and level, and without cracking and grain separation at bends.
 - b. Continuously weld all joints and seams except where other methods of joining are indicated; grind welds smooth and flush on exposed surfaces. Comply with AWS and other metal authorities.
 - c. Use filler metals and welding procedures which will blend with and match the color of sheet metal being joined and will avoid discoloration at welds. Required on stainless

steel or unpainted aluminum only.

B. GALVANIZING:

1. Provide a zinc coating for those items shown or specified to be galvanized, as follows:
 - a. ASTM A153 / A153M-16a for galvanizing iron and steel hardware.
 - b. ASTM A123 / A123M-15 for galvanizing rolled, pressed and forged steel shapes, assembled steel products, plates, bars and strip 1/8" thick and heavier.
2. Fabricate joints which will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.

C. SHOP PAINTING:

1. Shop paint miscellaneous metal work, except members or portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded, and galvanized surfaces, unless otherwise indicated. Do not paint stainless steel items. Paint only aluminum items designated to be painted.
2. SURFACE PREPARATION: Prepare ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
 - a. EXTERIORS (SSPC ZONE 1B): SSPC-SP6 "Commercial Blast Cleaning".
 - b. INTERIORS (SSPC ZONE 1A): SSPC-SP3 "Power Tool Cleaning".
3. Immediately after surface preparation, spray on primer in accordance with manufacturer's instructions, and at a rate to provide uniform dry film thickness of 2.0 mils for each coat. Use painting methods which will result in full coverage of joints, corners, edges and exposed surfaces.
4. Apply 1 shop coat to fabricated metal items, except apply 2 coats of paint to surfaces inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements
- B. FIELD MEASUREMENTS: Take field measurements prior to preparation of shop drawings and fabrication, where possible, do not delay job progress; allow for trimming and fitting where taking field measurements before fabrication might delay work.

3.02 DELIVERY, STORAGE AND HANDLING: Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

3.03 PREPARATION – NOT USED

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. GENERAL
 - a. FASTENING TO IN PLACE CONSTRUCTION: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in place construction; including, 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 work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established

lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete masonry or similar construction.

- c. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch up shop paint coat. 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.
- d. FIELD WELDING: Comply with AWS Code for procedures of manual shielded metal arc welding, appearance and quality of welds made, and methods used in correcting welding work.

2. SETTING LOOSE PLATES:

- a. Clean concrete and masonry bearing surfaces of any bond reducing materials and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.
- b. Set loose leveling and bearing plates on wedges, or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout. Use metallic non shrink grout in concealed locations where not exposed to moisture; use nonmetallic non shrink grout in exposed locations, unless otherwise indicated.
- c. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

- B. COORDINATION WITH OTHER WORK: Furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.05 FIELD QUALITY CONTROL:

- A. Errors of shop drawings, fabrication, correct fitting and alignment of the various metal items or component members shall be the responsibility of the Contractor.
- B. Contractor shall make measurements in field to verify or supplement dimensions shown on drawings and be responsible for accurate fit of specified work Site Tests, Inspection

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- 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. Apply to provide a minimum dry film thickness of 2.0 mils.
- B. FOR GALVANIZED SURFACES: Clean field welds, bolted connections and abraded areas and apply 2 coats of galvanizing repair paint.

PART 4 SCHEDULES – NOT USED

END OF SECTION

DIVISION - 6 WOOD AND PLASTICS

06 10 00 ROUGH CARPENTRY

06 20 00 FINISH CARPENTRY

06 40 00 ARCHITECTURAL MILLWORK

06 60 00 SOLID POLYMER FABRICATIONS

END OF SECTION

ROUGH CARPENTRY 06 10 00

PART 1 GENERAL

1.01 SUMMARY:

- A. GENERAL DESCRIPTION: Rough carpentry includes carpentry work not specified as part of other sections and which is generally not exposed, except as otherwise indicated. Types of work in this section include rough carpentry for wood nailers, blocking, bracing, sleepers, and sheathing.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES:

- A. LUMBER STANDARDS: Comply with PS 20 and with applicable rules of the respective grading and inspecting agencies for species and products indicated.
- B. PLYWOOD PRODUCT STANDARDS: Comply with PS 1 (ANSI A199.1) or, for products not manufactured under PS 1 provisions, with applicable APA Performance Standard for type of panel indicated.

1.03 SUBMITTALS:

A. PRODUCT DATA:

- 1. Submit manufacturer's specifications and installation instructions for materials listed below:
 - a. Wood treatment data: Submit treatment manufacturer's instructions for proper use of each type of treated material.
 - i. PRESSURE TREATMENT: For each type specified, include certification by treating plant stating chemicals and process used, net amount of preservative retained and conformance with applicable standards.
 - ii. FOR WATER-BORNE PRESERVATIVES, include statement that moisture content of treated materials was reduced to a maximum of 15% prior to shipment to project site.
 - iii. FIRE-RETARDANT TREATMENT: Include certification by treating plant that treatment material complies with governing ordinances and that treatment will not bleed through finished surfaces.

1.04 QUALITY ASSURANCE:

A. QUALIFICATIONS:

- 1. INSTALLATION – QUALIFIED and experienced personnel are to perform work to meet project requirements.

- B. CERTIFICATIONS: When dimensional lumber is provided to comply with minimum allowable unit stresses, submit listing of species and grade selected for each use, and submit evidence of compliance with specified requirements. Compliance may be in form of a signed copy of applicable portion of lumber producer's grading rules showing design values for selected species and grade. Design values shall be as approved by the Board of Review of American Lumber Standards Committee.

1.05 SYSTEM DESCRIPTION:

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.
- B. DESIGN / PERFORMANCE REQUIREMENTS
 - 1. FACTORY-MARK each piece of lumber with type, grade, mill and grading agency, except omit marking from surfaces to be exposed with transparent finish or without finish.

2. NOMINAL SIZES are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use.
 - a. PROVIDE DRESSED LUMBER, S4S, unless otherwise indicated.
 - b. PROVIDE SEASONED LUMBER with 19% maximum moisture content at time of dressing: 12% for wood in contact with concrete or masonry. Furnish moisture content certificate if required.
- 1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS / EQUIPMENT:

A. FRAMING LUMBER (2" THROUGH 4" THICK) (WD-FRM):

1. FOR LIGHT FRAMING (less than 6" wide), provide the following grade and species:
 - a. Standard grade, any species.
2. FOR STRUCTURAL FRAMING (6" and wider and from 2" to 4" thick), provide the following grade and species:
 - a. No. 2 grade.
 - b. Douglas Fir (WCLB or WWPA).
 - c. Southern Pine (SPIB).
 - d. Redwood (RIS).

B. BOARDS (LESS THAN 2" THICK):

1. CONCEALED BOARDS: Where boards will be concealed by other work, provide lumber of 19% maximum moisture content (S-DRY) and of following species and grade:
 - a. Redwood Construction Common (RIS), Southern Pine No. 2 Boards (SPIB), or any species graded Construction Boards (WCLB or WWPA).

C. PLYWOOD (PWD):

1. TRADEMARK: Identify each plywood panel with appropriate APA trademark.
2. CONCEALED PERFORMANCE-RATED PLYWOOD: Where plywood panels will be used for the following concealed types of applications; provide APA Performance-Rated Panels complying with requirements indicated for grade designation, span rating, exposure durability classification, edge detail (where applicable) and thickness.
 - a. SUBFLOORING AT PLATFORMS: Provide APA rated sheathing with following characteristics:
 - i. EXPOSURE/DURABILITY CLASSIFICATION: Exterior.
 - ii. SPAN RATING: As required to suit spacing of supporting structure shown on drawings.
 - iii. FIRE TREATED
 - b. UNDERLAYMENT FOR SUSPENDED GYPSUM BOARD CEILINGS: Provide APA rated sheathing with following characteristics:
 - i. EXPOSURE/DURABILITY CLASSIFICATION: Exterior.
 - ii. SPAN RATING: As required to suit spacing of supporting structure shown on drawings.
3. PLYWOOD BACKING PANELS: For mounting electrical or telephone equipment, provide fire-retardant treated plywood panels with grade designation, APA C-D PLUGGED INT with exterior glue, in 3/4" thickness.
4. PLYWOOD UNDERLAYMENT: Provide plywood panels complying with the following requirements:
 - a. GRADE DESIGNATION: APA UNDERLAYMENT INT with exterior glue.

b. GROUP NUMBER: Group 1 species

2.02 WOOD STRUCTURAL PANELS

- A. Plywood at subflooring, roof deck, and exterior walls with metal panels, otherwise plywood or oriented strand board. Subflooring shall have tongue and groove edges.
- B. Thickness: Not less than indicated.
- C. Panel Grade: APA rated sheathing per DOC PS 1 and PS-2.
- D. Exposure 1 durability classification.
- E. Factory mark panels according to indicated standard.

2.03 ENGINEERED WOOD PRODUCTS

- A. Wood I-Joists: Prefabricated units, I-shaped in cross section, made with solid or structural composite lumber flanges and wood-based structural panel webs, let into and bonded to flanges. Provide units complying with material requirements of and with structural capacities established and monitored according to ASTM D 5055.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Georgia-Pacific.
 - b. Weyerhaeuser Company.
 - 2. Provide I-joists manufactured without urea formaldehyde.
 - 3. Web Material: Either oriented strand board or plywood, complying with DOC PS 1 or DOC PS 2, Exposure 1.
 - 4. Structural Properties: Provide units with depth and design values not less than those indicated.
 - 5. Provide units complying with APA PRI-400, factory marked with APA trademark indicating nominal joist depth, joist class, span ratings, mill identification, and compliance with APA standard.
- B. Rim Boards: Product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research/evaluation report for I-joists.
 - 1. Manufacturer: Provide products by same manufacturer as I-joists.
 - 2. Material: glued-laminated wood or product made from any combination solid lumber, wood strands, and veneers. Provide rim boards made without urea formaldehyde.
 - 3. Thickness: 1-1/4 inches.
 - 4. Provide performance-rated products complying with APA PRR-401, rim board grade, factory marked with APA trademark indicating thickness, grade, and compliance with APA standard.
 - 5. Vertical load capacity: 4,250 plf
 - 6. Horizontal shear parallel to grain: 400 psi
 - 7. Modulus of elasticity: 1,300,000 psi

2.04 FIRE TREATED FINISHES – NOT USED

2.05 ACCESSORIES

- A. FASTENERS AND ANCHORAGES: Provide size, type, material, and finish as indicated and as recommended by applicable standards, complying with applicable Federal Specifications for nails, staples, screws, bolts, nuts, washers and anchoring devices. Provide metal

hangers and framing anchors of the size and type recommended by the manufacturer for each use including recommending nails.

- B. JOINT TAPE: Polyguard Detail Tape and primer as recommended and manufactured by Polyguard Products, Inc. for use on gypsum sheathing.

2.06 FABRICATION – NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE:

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING: Keep materials dry at all times. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber and plywood and provide air circulation within stacks.

3.03 PREPARATION

- A. JOB CONDITIONS: Field verify that work in place, substrates, etc. are ready to receive work. Coordinate with work of other trades.

3.04 CONSTRUCTION / INSTALLATION:

A. GENERAL:

1. DISCARD UNITS OF MATERIAL with defects which might impair quality of work, and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement.
2. SET CARPENTRY WORK accurately to required levels and lines, with members plumb and true and accurately cut and fitted.
3. SECURELY ATTACH CARPENTRY WORK to substrate by anchoring and fastening as shown and as required by recognized standards. Countersink nail heads on exposed carpentry work and fill holes.
4. Use common wire nails, except as otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required.

B. CONSTRUCTION / INSTALLATION

1. WOOD NAILERS, BLOCKING AND SLEEPERS:
 - a. PROVIDE WHEREVER SHOWN and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.
 - b. ATTACH TO SUBSTRATES as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise shown. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.
 - c. PROVIDE PERMANENT GROUNDS of dressed, preservative treated, key-beveled lumber not less than 1-1/2" wide and of thickness required to bring face of ground to exact thickness of finish material involved. Remove temporary grounds when no longer required.
2. WOOD FURRING (WD-FUR):
 - a. INSTALL PLUMB AND LEVEL with closure strips at edges and openings. Shim with wood as required for tolerance of finished work. Space as shown on drawings or if not shown space at 16" o.c.
3. WOOD FRAMING, GENERAL (WD-FRM):

- a. PROVIDE FRAMING MEMBERS of sizes and on spacings shown, and frame openings as shown, or if not shown, comply with recommendations of "Manual for House Framing" of National Forest Products Association. Do not splice structural members between supports.
 - b. ANCHOR AND NAIL as shown, and to comply with "Recommended Nailing Schedule" of "Manual for House Framing" and other recommendations of NFPA.
 - c. FIRESTOP concealed spaces with wood blocking not less than 2" thick, if not blocked by other framing members. Provide blocking at each building floor level and at ends of joist spans.
 - i. Sub flooring at 45° angle with supports.
4. INSTALLATION OF PLYWOOD; GENERAL: Comply with applicable recommendations contained in APA PRP-108, "Performance Standards and Qualification Policy for Structural – Use Panels," for types of plywood products and applications indicated.
- C. COORDINATION WITH OTHER WORK: Fit carpentry work to other work; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds and similar supports to allow proper attachment of other work.
- 3.05 FIELD QUALITY CONTROL – NOT USED
- 3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION

FINISH CARPENTRY 06 20 00

PART 1 GENERAL

1.01 RELATED DOCUMENTS:

- A. General provisions of the Contract and other applicable parts of the Construction Documents apply to this section.

1.02 DESCRIPTION OF WORK:

- A. DEFINITION: Finish carpentry includes carpentry work which is exposed to view, is nonstructural, and which is not specified as part of other sections.
- B. TYPES of finish carpentry work in this section include:
 - 1. Exterior running and standing trim.
 - 2. Interior running and standing trim.
 - 3. Plywood panels.
 - 4. Hardwood paneling, board type.
- C. ROUGH CARPENTRY is specified in another 06 10 00.
- D. ARCHITECTURAL WOODWORK is specified in another 06 40 00.

1.03 QUALITY ASSURANCE:

- A. FACTORY-MARK each piece of lumber and plywood with type, grade, mill and grading agency identification; except omit marking from surfaces to receive transparent finish, and submit mill certificate that material has been inspected and graded in accordance with requirements if it cannot be marked on a concealed surface.
- B. FIRE-RETARDANT MARKING: Mark each unit of fire-retardant treated lumber and plywood with classification marking of Underwriters Laboratory, Inc., or other testing and inspecting agency acceptable to authorities having jurisdiction. Place marking on surfaces which will not be exposed after installation.

1.04 SUBMITTALS:

- A. PRODUCT DATA: Submit manufacturer's specifications and installation instructions for each item of factory-fabricated siding and paneling.
- B. SAMPLES: Submit the following samples for each species and cut or pattern of finish carpentry.
 - 1. INTERIOR STANDING AND RUNNING TRIM: 2'-0" long x full board or molding width, unfinished.
 - 2. PLYWOOD PANELING: 2'-0" long x panel width.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. PROTECT finish carpentry materials during transit, delivery, storage and handling to prevent damage, soiling and deterioration.
- B. DO NOT DELIVER finished carpentry materials, until painting, wet work, grinding and similar operations which could damage, soil, or deteriorate woodwork have been completed in installation areas. If, due to unforeseen circumstances, finish carpentry materials must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

1.06 JOB CONDITIONS:

- A. CONDITIONING: Installer shall advise Contractor of temperature and humidity requirements for finished carpentry installation areas. Do not install finished carpentry until required temperature and relative humidity conditions have been stabilized and will be maintained in installation areas.
- B. MAINTAIN TEMPERATURE AND HUMIDITY in installation area as required to maintain moisture content of installed finish carpentry within a 1.0% tolerance of optimum moisture content, from date of installation through remainder of construction period. The fabricator of

woodwork shall determine optimum moisture content and required temperature and humidity conditions.

PART 2 PRODUCTS

2.01 WOOD PRODUCT QUALITY STANDARDS:

- A. **SOFTWOOD LUMBER STANDARDS:** Comply with PS 20 and with applicable grading rules of the respective grading and inspecting agency for the species and product indicated.
- B. **PLYWOOD STANDARD:** Comply with PS 1/ANSI A199.1.
- C. **HARDWOOD LUMBER STANDARD:** Comply with National Hardwood Lumber Association (NHLA) rules.
- D. **HARDWOOD PLYWOOD STANDARD:** Comply with HP-1.
- E. **WOODWORKING STANDARD:** Where indicated for a specific product comply with specified provision of the following:
 - 1. Architectural Woodwork Institute (AWI) "Quality Standards".

2.02 MATERIALS:

A. GENERAL:

- 1. **NOMINAL SIZES** are indicated, except as shown by detailed dimensions. Provide dressed or worked and dressed lumber, as applicable, manufactured to the actual sizes as required by PS 20 or to actual sizes and pattern as shown, unless otherwise indicated.
- 2. **MOISTURE CONTENT OF SOFTWOOD LUMBER:** Provide kiln dried (KD) lumber having a moisture content from time of manufacture until time of installation not greater than values required by the applicable grading rules of the respective grading and inspecting agency for the species and product indicated.
- 3. **LUMBER FOR TRANSPARENT FINISH (STAINED OR CLEAR):** Use pieces made of solid lumber stock.
- 4. **PLYWOOD FOR TRANSPARENT FINISH (CLEAR OR STAINED):** Redwood, complying with PS 1 for special Exterior Grade and bearing APA 303 SIDING grade trademark, with all heartwood face veneer, saw textured, thickness and size as indicated; factory treated with manufacturer's standard water repellent, and with the following face pattern.

B. INTERIOR FINISH CARPENTRY:

- 1. **WM/SERIES WOOD MOLDING PATTERNS:** For stock molding patterns graded under Wood Molding and Millwork Producers Industry WM 4, provide the following grade based on finish indicated and fabricated from any Western softwood species graded and inspected by WWPA.
 - a. **MOLDINGS FOR TRANSPARENT FINISH:** N-Grade.
 - b. **MOLDINGS FOR PAINTED FINISH:** P-Grade.
- 2. **HARDWOOD PLYWOOD STOCK PANELS:** Provide manufacturer's stock hardwood plywood panels complying with applicable requirements of HP-1 for species and grade of face veneers and backing, adhesive, construction, thickness, panel size, and finish.
 - a. **FACE VENEER SPECIES:** Rotary cut Natural Birch
 - 1) **GRADE:** Premium.
 - b. **BACKING VENEER SPECIES:** Any hardwood compatible with face species.
 - 1) **GRADE:** Sound.
 - c. **PLYWOOD TYPE (WATER RESISTANCE CAPABILITY):** Type I (Exterior).
 - d. **PLYWOOD TYPE (WATER RESISTANCE CAPABILITY):** Type II (Interior).
 - e. **FACE PATTERN:** Plain (no grooves) with veneer edge matched within each panel face to comply with type of match required by referenced product standard.
 - f. **FACE PATTERN:** V-grooved, standard random pattern with edge grooves and grooves at center of panel and at third points of panel.
 - g. **FACE VENEER MATCHING (PANEL-TO-PANEL):** Sequence matched from one or similar flitches as required by quantity of panels.

2.03 WOOD TREATMENT:

- A. FIRE-RETARDANT TREATED WOOD (FRTW): Where wood is indicated as "FRTW", provide materials complying with applicable standards for pressure impregnation with fire-retardant chemicals and with the following requirements.
 - 1. FOR FRTW WOOD USED IN INTERIOR APPLICATIONS not exposed to relative humidity's more than 92% use treatment chemicals with reduced hygroscopicity which are noncorrosive to metal fasteners, are non-blooming and permit use of transparent oil-based finishes.
 - a. PRODUCTS: Subject to compliance with requirements, provide one of the following:
 - 1) "Dricon"; Koppers Company, Inc.
 - 2) "Flameproof LHC"; Osmose Wood Preserving Co. of America, Inc.
 - 3) "Protex"; Hoover Universal Wood Preserving Division.
 - 2. KILN-DRY WOOD after treatment to a maximum moisture content of 15% after treatment.
 - 3. INSPECT each piece of lumber and plywood or each unit of finished carpentry after drying; do not use twisted, warped, bowed or otherwise damaged or defective wood.

PART 3 EXECUTION

3.01 PREPARATION:

- A. CONDITION WOOD MATERIALS to average prevailing humidity conditions in installation areas prior to installation.
- B. BACKPRIME LUMBER for painted finish exposed on the exterior or, where indicated, to moisture and high relative humidity's on the interior. Comply with requirements of section on painting within Division 9 for primers and their application.
- C. PREINSTALLATION MEETING: Meet at project site prior to delivery of finished carpentry materials and review coordination and environmental controls required for proper installation and ambient conditioning in areas to receive work. Include in meeting the Contractor, Architect-Engineer, and other Owner Representatives (if any), Installers of finish carpentry, wet work including plastering, other finishes, painting, mechanical work and electrical work, and firms and persons responsible for continued operation (whether temporary or permanent) of HVAC system as required to maintain temperature and humidity conditions. Proceed with finishing carpentry on interior only when everyone concerned agrees that required ambient conditions can be properly maintained.

3.02 INSTALLATION:

- A. DISCARD units of material which are unsound, warped, bowed twisted, improperly treated, not adequately seasoned or too small to fabricate work with minimum of joints or optimum jointing arrangements, or which are of defective manufacture with respect to surfaces, sizes or patterns.
- B. INSTALL THE WORK PLUMB, level, true and straight with no distortions. Shim as required using concealed shims. Install to a tolerance of 1/8" in 8'-0" for plumb and level countertops; and with 1/16" maximum offset in flush adjoining 1/8" maximum offsets in revealed adjoining surfaces.
- C. SCRIBE AND CUT work to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.
- D. STANDING AND RUNNING TRIM: Install with the minimum number of joints possible, using full-length pieces (from maximum lengths of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners, to produce tight fitting joints with full surface contact throughout length of joint. Use scarf joints for end-to-end joints.
- E. ANCHOR FINISH CARPENTRY WORK to anchorage devices or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fasteners heads are required, use fine finishing nail for exposed

nailing's, countersunk and filled flush with finished surface, and matching final finish where transparent is indicated.

3.03 ADJUSTMENT, CLEANING, FINISHING AND PROTECTION:

- A. REPAIR DAMAGED and defective finish carpentry work wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance.
- B. CLEAN FINISH CARPENTRY WORK on exposed and semi-exposed surfaces. Touch-up shop-applied finishes to restore damaged or soiled areas.
- C. REFER TO DIVISION-9 sections for final finishing of installed finish carpentry work.
- D. PROTECTION: Installer of finished carpentry work shall advise Contractor of final protection and maintained conditions necessary to ensure that work will be without damage or deterioration at time of acceptance.

PART 4 SCHEDULES – NOT USED

END OF SECTION

ARCHITECTURAL MILLWORK 06 40 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Woodwork or millwork including laminate-clad custom cabinets and solid surface countertops, wood trim, and paneling. Also included is the hardware, adhesives, and wood treatments needed for these wood fabrications.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. Reference Standards: In addition to requirements shown or specified, comply with applicable provisions of following for design, materials, fabrication, and installation of component parts:
 - 1. Architectural Woodwork Quality Standards of Architectural Woodwork Institute (AWI).

1.03 SUBMITTALS

- A. PRODUCT DATA: Submit manufacturer's product data for each product and process specified as work of this section and incorporated into items of architectural woodwork during fabrication, finishing, and installation.
- B. SHOP DRAWINGS: Submit shop drawings indicating profiles, sections, sizes, thickness, quantities, markings, materials, wood species, finishes, accessories, and locations of each item.
 - 1. Include assembly and installation drawings to show methods of wood blocking, fastening, bracing, jointing, and connecting to work of other trades.
 - 2. Scale: 3/4 inch = 1 foot for full sections, and 3 inches = 1 foot for details.
 - 3. Show flitch layout for veneers.
- C. SAMPLES: Submit the following samples.
 - 1. Plastic laminate, manufacturer's sample for each type, color, pattern and surface finish.
 - 2. Solid surface, manufacturer's sample for each type, color, pattern and surface finish.
 - 3. Exposed cabinet hardware, one unit of each type and finish.
 - 4. Provide a mockup that is a minimum of 18"X36" which contains of each specified species of materials with appropriate conditions with chosen finish.

1.04 QUALITY ASSURANCE

A. QUALIFICATIONS

- 1. INSTALLER QUALIFICATIONS: Arrange for installation of architectural woodwork by a firm which can demonstrate successful experience in installing architectural woodwork items similar in type and quality to those required for this project.

B. CERTIFICATIONS

- 1. Lumber Grades: AWI Section 100.
- 2. Panel Products: AWI Section 200.
- 3. Standing and Running Trim: AWI Section 300.
- 4. Installation: AWI Section 1700.

- C. PRE-INSTALLATION MEETING: Meet at project site prior to delivery of architectural woodwork and review coordination and environmental controls required for proper installation and ambient conditioning in areas to receive work. Include in meeting the Contractor; Architect-Engineer, Construction Manager and other Owner Representatives (if any); Installers of architectural woodwork, wet work such as plastering, other finishes, painting, mechanical work and electrical work; and firms or persons responsible for continued operation (whether temporary or permanent) of HVAC system as required to maintain temperature and humidity conditions. Proceed with woodwork installation only when everyone concerned agrees that required ambient conditions can be maintained.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.
B. DESIGN / PERFORMANCE REQUIREMENTS – NOT USED

- 1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

A. ARCHITECTURAL CABINETS, LAMINATE CLAD

1. CUSTOM GRADE shall be in the following locations: All locations.
 - a. TYPE OF CABINET CONSTRUCTION: Flush overlay
 - b. LAMINATE CLADDING: High pressure decorative laminate complying with NEMA LD 3 and as follows:
 - i. LAMINATE GRADE FOR EXPOSED SURFACES: Provide laminate cladding complying with the following requirements for type of surface and grade.
 - (A) HORIZONTAL SURFACES OTHER THAN TOPS: GP-50 (0.050" nominal thickness).
 - (B) VERTICAL SURFACES: GP-28 (0.028" nominal thickness)
 - (C) EDGES: GP-28 (0.028" nominal thickness)
 - ii. SEMI-EXPOSED SURFACES: Provide surface materials indicated below:
 - (A) Cabinet laminate, CL-20, Color to be White.
 - (B) White Melamine
2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Wilsonart
 - b. Formica Corp.
 - c. Nevamar Corp.

B. ARCHITECTURAL COUNTERTOPS, SOLID SURFACE

1. Countertop: 3/4" (19 mm) thick solid polymer material, adhesively joined with inconspicuous seams; edge details as specified on the Architect's Drawings. Surfaces to be unaffected by Class I reagents and repairable after exposure to Class II reagents.
 - a. Homogeneous filled acrylic; not coated, laminated or of composite construction; meeting ANSI Z124.3 & .6, Type Six, and Fed. Spec. WW-P-541E/GEN.
 - b. Material shall have minimum physical and performance properties specified in the following Section 2.05.
 - c. Superficial damage to a depth of 0.010" (.25 mm) shall be repairable by sanding and polishing.
 - d. Finish: Ensure surfaces have uniform finish: Matte, with a 60° gloss rating of 5 - 20.

2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. DuPont Corian
 - b. Durasein
 - c. Wilsonart
 - d. Formica Corp.
- C. BULLET RESISTANT FIBERGLASS SHIELD:
1. The 1/2" panels shall be made of multiple layers of starch-oil woven roving ballistic grade fiberglass cloth impregnated with a thermoset polyester resin and compressed into flat rigid sheets. The production technique and materials used shall provide the controlled internal delamination to permit the encapture of a penetrating projectile.
 2. Bullet Resistant Fiberglass panels shall be UL Listed Armortex, O.F. 300 (Level 3) manufactured by Safeguard Security Services, Inc., San Antonio, Texas. Phone: (210)661-8306, (800)880-8306, Fax: (210)661-8308.
- 2.02 FINISHES
- A. COLORS, PATTERNS AND FINISHES: As selected by Architect-Engineer from laminate / solid surface manufacturers' standard products.
- 2.03 ACCESSORIES
- A. CABINET HARDWARE AND ACCESSORY MATERIALS:
1. GENERAL: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items which are specified in Division-8 section "Finish Hardware".
 2. CABINET HARDWARE SCHEDULE: Refer to schedule at end of this section for cabinet hardware required for architectural cabinets.
 3. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Baldwin
 - b. Knap & Vogt
- 2.04 FABRICATION
- A. WOOD MOISTURE CONTENT: Comply with requirements of referenced quality standard for moisture content of lumber at time of fabrication and for relative humidity conditions in the installation areas.
- B. FABRICATE WOODWORK to dimensions, profiles, and details indicated with openings and mortises precut, where possible, to receive hardware and other items and work.
1. Ease edges to a 1/16" radius, for corners of cabinets and edges of solid wood (lumber) members less than 1" in nominal thickness, 1/8" radius for edges of rails and similar members over 1" in nominal thickness.
- C. COMPLETE FABRICATION, assembly, hardware application, and other work before shipment to project site to maximum extent possible. Disassemble components only as necessary for shipment, finishing, and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- D. PRECUT OPENINGS: Fabricate architectural woodwork with precut openings, where possible, to receive hardware, appliances, plumbing fixtures, electrical work and similar items. Locate openings accurately and use templates or rough-in diagrams for proper size and shape. Smooth edges of cutoffs and, where located in countertops and similar exposures seal edges of cutouts with a water-resistant coating.

- E. MEASUREMENTS: Before proceeding with fabrication of woodwork required to be fitted to other construction, obtain field measurements, and verify dimensions and shop drawing details as required for accurate fit.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING

- A. PROTECT WOODWORK during transit, delivery, storage, and handling to prevent damage, soiling and deterioration.
- B. DO NOT DELIVER woodwork until painting, wet work, grinding and similar operations which could damage, soil or deteriorate woodwork have been completed in installation areas. If, due to unforeseen circumstances, woodwork must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

3.03 PREPARATION

A. JOB CONDITIONS

1. CONDITIONING: Woodwork Manufacturer and Installer shall advise Construction Manager of temperature and humidity requirements for woodwork installation and storage areas. Do not install woodwork until required temperature and relative humidity have been stabilized and will be maintained in installation areas.
2. MAINTAIN TEMPERATURE AND HUMIDITY in installation area as required to maintain moisture content of installed woodwork within a 1.0% tolerance of optimum moisture content, from date of installation through remainder of construction period. Require Woodwork Manufacturer to establish optimum moisture content and required temperature and humidity conditions.

B. SURFACE PREPARATIONS – NOT USED

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. INSTALL WOODWORK PLUMB, level, true and straight with no distortions. Shim as required using concealed shims. Install to a tolerance of 1/8" in 8'-0" for plumb and level (including tops); and with no variations in flushness of adjoining surfaces.
2. SCRIBE AND CUT woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.
3. ANCHOR WOODWORK to anchors or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fasteners heads are required, use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork, and matching final finish where transparent finish is indicated.
4. CABINETS: Install without distortion so that doors and drawers' fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete the installation of hardware and accessory items as indicated.
5. TOPS: Anchor securely to base units and other support systems as indicated.

B. COORDINATION WITH OTHER WORK

1. Bore cable holes and provide grommets where below desktop electrical, data and telephone outlets occur. Provide openings as required for the routing of conduits, raceways, and other equipment provisions where necessary. Provide cutouts as necessary for plumbing and lavatory bowls where indicated. Coordinate with the work of all other trades in the fabrication and installation of all cabinets, counters, and built-in desktops.

3.05 FIELD QUALITY CONTROL – NOT USED

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. REPAIR DAMAGED and defective woodwork where possible to eliminate defects functionally and visually, where not possible to repair replace woodwork. Adjust joinery for uniform appearance.
- B. CLEAN, lubricate and adjust hardware.
- C. CLEAN WOODWORK on exposed and semi-exposed surfaces. Touch-up shop-applied finishes to restore damaged or soiled areas.
- D. COMPLETE THE FINISHING work specified as work of this section, to whatever extent not completed at shop or prior to installation of woodwork.
- E. Provide final protection and maintain conditions, in a manner acceptable to Fabricator and Installer, which ensures architectural woodwork being without damage or deterioration at time of substantial completion.

PART 4 SCHEDULES

4.01 CABINET FINISH HARDWARE: See drawings for specific locations of hardware.

- A. FULL OVERLAY FRAMELESS CONCEALED HINGES: Knape & Vogt KV Hinge or similar.
- B. DRAWER SLIDES: Knape & Vogt 6500 full extension slides, 125-lb. capacity or similar.
- C. CABINET DOOR/DRAWER WIRE PULLS, SURFACE: Baldwin 4674 or similar.
- D. MAGNETIC CABINET DOOR CATCHES: Knape & Vogt 918 ALUM or similar.
- E. ADJUSTABLE SHELVING: Knape & Vogt 255, all with required shelf clips, or similar.
- F. LOCKS: Knape & Vogt 984KA 90 NP Plunger Lock or similar.
- G. FINISH: Handle finish to be selected by the Owner / Architect.

END OF SECTION

SOLID POLYMER FABRICATIONS 06 60 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Provide windowsills as defined in the drawings.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. Reference Standards: In addition to requirements shown or specified, comply with applicable provisions of following for design, materials, fabrication, and installation of component parts:
 - 1. American National Standards Institute (ANSI)
 - 2. American Society for Testing and Materials (ASTM)
 - 3. National Electrical Manufacturers Association (NEMA)
 - 4. Federal Specifications (FS)

1.03 SUBMITTALS

- A. PRODUCT DATA: Submit manufacturer's product data for each product and process specified as work of this section and incorporated into items of architectural woodwork during fabrication, finishing, and installation.
- B. SHOP DRAWINGS: Submit shop drawings indicating dimensions, component sizes, fabrication details, attachment provisions and coordination requirements with adjacent work.
- C. SAMPLES Submit a minimum 2" x 2" (50 mm x 50 mm) samples. Indicate full range of color and pattern variation. Approved samples will be retained as standards for work.

1.04 QUALITY ASSURANCE

- A. QUALIFICATIONS
 - 1. INSTALLER QUALIFICATIONS: For warranty coverage, fabricator/installer shall be approved by solid polymer manufacturer.
 - 2. ALLOWABLE TOLERANCES
 - a. Variation in component size: $\pm 1/8"$ (3 mm).
 - b. Location of openings: $\pm 1/8"$ (3 mm) from indicated location.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

- A. WINDOWSILLS
 - 1. Windowsills: 1/2" (13 mm) thick solid polymer material, adhesively joined with inconspicuous seams; edge details as indicated on the Architect's Drawings.
 - a. Homogeneous filled acrylic; not coated, laminated or of composite construction; meeting IAPMO Z124, Type Six, and Fed. Spec. WW-P-541E/GEN.
 - b. Material shall have minimum physical and performance properties specified in the following Section 2.05.

- c. Superficial damage to a depth of 0.010" (.25 mm) shall be repairable by sanding and polishing.
- 2. Manufacturers: Subject to compliance with requirements, provide products from the following or acceptable equivalent:
 - a. DuPont Corian; www.dupont.com
 - b. Durasein; www.durasein.com
 - c. Wilsonart; www.wilsonart.com

2.02 FINISHES

- A. COLORS AND PATTERNS: As selected by Architect-Engineer from manufacturers' standard products.
- B. FINISHES: All surfaces shall have uniform finish, Matte with gloss rating of 5 – 20.

2.03 ACCESSORIES

- A. JOINT ADHESIVE: Manufacturer's standard two-part adhesive kit to create inconspicuous, non-porous joints, with a chemical bond.

2.04 FABRICATION

- A. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and solid polymer manufacturer requirements.
- B. Form joints between components using manufacturer's standard joint adhesive. Joints shall be inconspicuous in appearance and without voids. Attach 2" (50 mm) wide reinforcing strip of solid polymer material under each joint.
- C. Provide holes and cutouts for plumbing and bath accessories as indicated on the drawings.
- D. Rout and finish component edges to a smooth, uniform finish. Rout all cutouts, then sand all edges smooth. Repair or reject defective or inaccurate work.

2.05 PHYSICAL AND PERFORMANCE PROPERTIES

PROPERTY	REQUIREMENT (min or max)	TEST PROCEDURE
A. Tensile Strength	5000 psi min	ASTM D638
B. Tensile Modulus	1.0 x 10 ⁶ psi min	ASTM D638
C. Flexural Strength	7000 psi min	ASTM D790
D. Flexural Modulus	1.0 x 10 ⁶ psi min	ASTM D790
E. Elongation	0.3% min.	ASTM D638
F. Hardness	90-Rockwell "M" scale min. 52-Barcol Impresser min.	ASTM D758 ASTM D2583
G. Thermal Expansion	3.5 x 10 ⁻⁶ in/in/deg C. max. 1.95 x 10 ⁻⁶ in/in/deg F. max.	ASTM D696
H. Color Stability	No change, 100 hours min.	NEMA LD3-3.10
I. Wear and Cleanability	Passes	ANSI Z124.3
J. Abrasion Resistance	No loss of pattern max. weight loss (1000cycles) =0.9g.	NEMA LD3-3.01 ANSI Z124.3
K. Boiling water Surface Resistance	No Change	NEMA LD3-3.05
L. High Temperature Resistance	No Change	NEMA LD3-3.06
M. Impact Resistance Notched Izod Gardner	0.24 ft.-lbs.min. 9.0 ft-lbs min.	ASTM D256, Method A ASTM D3029

N. Ball drop		NEMA LD3-303
1/4" sheet	36" min, 1/2 lb ball, no failure	
1/2" sheet	140" min, 1/2 lb ball, no failure	
3/4" sheet	200" min, 1/2 lb ball, no failure	
O. Bowls (point impact)	No cracks or chips	ANSI Z124.3 and 124.6
P. Stain Resistance	Passes	ANSI Z124.3
Q. Weatherability	No change,min. 1000 hours	ASTM D1499
R. Fungi and Bacteria	No Attack	ASTM G21, ASTM G22
S. Specific Gravity	1.6 min	
T. Flammability		ASTM E84

SOLID COLORS

	1/4"	1/2"	3/4"
1. Flame spread	25 max	25 max	25 max
2. Smoke developed	30 max	30 max	30 max

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING

- A. DO NOT DELIVER components to project site until areas are ready for installation. Store components indoors prior to installation.
- B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

3.03 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. INSTALL components plumb and level, in accordance with approved shop drawings and product installation details.
2. Provide backsplashes and end splashes as indicated on the drawings. Adhere to countertops using manufacturer's standard color-matched silicone sealant.
3. Keep components and hands clean during installation. Remove adhesives, sealants and other stains. Components shall be clean on Date of Substantial Completion.
4. Fabricator/Installer is to provide a commercial care and maintenance video, review maintenance procedures and warranty details with the director of maintenance upon completion of project.

3.04 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. REPAIR DAMAGED and defective materials where possible to eliminate defects functionally and visually; where not possible to repair/replace.
 1. Keep components and hands clean during installation. Remove adhesives, sealants and other stains. Components shall be clean on Date of Substantial Completion. Protect surfaces from damage until Date of Substantial Completion.
 2. Repair or replace damaged work that cannot be repaired to architect's satisfaction and invoice for the cost of repairs. Architect to pre-approve cost estimate before repairs are made.

PART 4 SCHEDULES – NOT USED

END OF SECTION

DIVISION - 7 THERMAL AND MOISTURE PROTECTION

- 07 21 00 INSULATION
- 07 31 13 ASPHALT SHINGLES
- 07 42 13 METAL WALL PANEL
- 07 72 00 ROOF ACCESSORIES
- 07 84 00 FIRESTOPPING
- 07 91 00 JOINT SEALERS

END OF SECTION

INSULATION 07 21 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Blanket-type and sound attenuation batt insulation to be used in the interior and exterior walls. All rated wall types will be filled with UL approved insulation as called out.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- 1. NAIMA – North America Insulation Manufacturer's Association
- 2. ICAA – Insulation Contractors Association of America
- 3. Department of Energy
- 4. ASTM C423-17 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; latest edition.
- 5. ASTM C518-15 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus, latest edition.
- 6. ASTM C612-14 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; latest edition.
- 7. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; latest edition.
- 8. ANSI FM 4880 – FM APPROVAL ANSI 4880
- 9. UL 1040 – Standard for Fire Test of Insulation Wall Construction; latest edition.
- 10. UL 1715 – Standard for Fire Test of Interior Finish Material; latest edition.

1.03 SUBMITTALS

- A. PRODUCT DATA: Submit manufacturer's product specifications and installation instructions for each type of insulation and vapor barrier material required.
- B. SHOP DRAWINGS – NOT USED

1.04 QUALITY ASSURANCE

A. QUALIFICATIONS

- 1. THERMAL RESISTANCE: Where insulation is identified by "R" value, provide thickness required to achieve indicated value.
- 2. FIRE AND INSURANCE RATINGS: Comply with fire-resistance, flammability and insurance ratings indicated, and comply with regulations as interpreted by governing authorities.
- 3. Single Source Responsibility: Furnish each insulation type from one manufacturer for entire Project, unless otherwise acceptable to Architect.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.
- B. DESIGN / PERFORMANCE REQUIREMENTS

1. Use fiberglass batt insulation at all thermal barriers in the exterior frame walls and where the drawings indicate to create a complete thermal envelope. Use the manufacturer's standard lengths and widths as required to coordinate with spaces to be insulated.
2. Use Sound Attenuation batt insulation at all interior partitions where sound attenuation is noted on the drawings.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS / EQUIPMENT

A. GLASS FIBER BATT INSULATION

1. Inorganic (non-asbestos) fibers formed with binders into resilient flexible blankets or semirigid batts; ASTM C665, Type as indicated, densities of not less than 0.5 lb. per cu. ft. for glass fiber units and not less than 2.5 lb. per cu. ft. for mineral wool units, R-value of 13; manufacturer's standard lengths and widths as required to coordinate with spaces to be insulated; types as follows:
 - a. PROVIDE TYPE II nonreflective vapor barrier faced units where indicated, with integral nailing flanges; barrier rating of 0.5 perms, other face (if any) with rating greater than 5.0 perms.

B. SOUND ATTENUATION BLANKETS:

1. ASTM C665, Type I; semi-rigid mineral fiber blanket without membrane, Class 25 flame spread, thicknesses as indicated.

C. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:

- a. CertainTeed Products Corp.; Valley Forge, PA
- b. Manville Bldg Materials Corp.; Denver, CO
- c. Owens Corning Fiberglas Corp.; Toledo, OH
- d. Dupont, Inc.; dupont.com

2.02 FINISHES – NOT USED

2.03 ACCESSORIES

- A. Insulation Fasteners: Impale clip type with retaining disc or plate, galvanized steel, adhered or mechanically fastened to surface to receive insulation, length to suit insulation thickness, capable of securely fastening insulation in place.
- B. Tape: Self-adhering pressure sensitive, compatible with insulation, foil type recommended by manufacturer of insulation.

2.04 FABRICATION –NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

A. REFER TO DIVISION 1 for General Requirements

B. Review of Existing Conditions

1. **INSTALLER MUST EXAMINE** substrates and conditions under which insulation work is to be performed and must notify Contractor in writing of unsatisfactory conditions. Do not proceed with insulation work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

2. CLEAN SUBSTRATES of substances harmful to insulations or vapor barriers, including removal of projections which might puncture vapor barriers.
3. CLOSE OFF OPENINGS in cavities to receive poured-in-place insulation, sufficiently to prevent escape of insulation. Provide bronze or stainless-steel screen (inside) where openings must be maintained for drainage or ventilation.

3.02 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling, and Unloading

1. Identify products with appropriate markings of applicable testing and inspecting organization.
2. Storage and Protection: Store materials raised off floor or ground and under cover to keep dry. Protect from weather, direct sun light, contamination, sources of ignition, and damage from construction operations. Protect insulations from becoming wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage and protection during installation.

3.03 PREPARATION – NOT USED

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. GENERAL:
 - a. COMPLY WITH THE MANUFACTURER'S INSTRUCTIONS for particular conditions of installation in each case. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with work.
 - b. EXTEND INSULATION FULL THICKNESS as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.
 - c. APPLY A SINGLE LAYER of insulation of required thickness, unless otherwise shown or required to make up total thickness.
2. GENERAL BUILDING INSULATION:
 - a. APPLY INSULATION UNITS to substrate by method indicated, complying with manufacturer's recommendations. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
 - b. Fit insulation tight within spaces and tight to exterior side of plumbing, mechanical, and electric services within plane of insulation leaving no gaps or voids.
 - c. Butt insulation tightly.
 - d. Cut and fit tightly around items penetrating insulation.
 - e. Stagger butt joints.
 - f. Use batts free of damage.
 - g. Install insulation within metal framing systems full height and width. Do not allow voids or openings to occur. Insulation is required for full width between studs, including cavity of each stud.
 - h. Cut and trim insulation neatly, to fit spaces.
 - i. Cut insulation oversize to ensure tight butt joints when installed. Cut insulation to fit around protrusions and irregularly shaped projections.
 - j. SET VAPOR BARRIER FACED UNITS with vapor barrier to warm side of construction, except as otherwise shown. Do not obstruct ventilation spaces, except for firestopping.
 - k. TAPE JOINTS and ruptures in vapor barriers and seal each continuous area of insulation to surrounding construction to ensure vapor-tight installation.

3.05 FIELD QUALITY CONTROL – NOT USED

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. Protect installed insulation and vapor barriers from harmful weather exposures and from possible physical abuses, where possible by non-delayed installation of concealing work or, where that is not possible, by temporary covering or enclosure. Installer shall advise Contractor of exposure hazards, including possible sources of deterioration and fire hazards.

PART 4 SCHEDULES

4.01 Provide thermal resistance (R Values) for insulation in locations as follows:

- A. Exterior Walls: Thermal resistance R Value of 13
- B. Soffits and Fascia's: Thermal resistance R Value of 13

END OF SECTION

ASPHALT SHINGLE ROOFING 07 31 13

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: All applicable parts of the General Roofing Specification (section 07 30 00) shall be included in this section.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- 1. NAIMA – North America Insulation Manufacturer’s Association
- 2. AC438-1011-R1 - New Acceptance Criteria for Alternative Asphalt Roofing Shingles
- 3. American Society of Civil Engineers (ASCE): ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- 4. Asphalt Roofing Manufacturers Association (ARMA).
- 5. ASTM International (ASTM):
 - a. ASTM D 3018 - Standard Specification for Class A Asphalt Shingles Surfaced with Mineral Granules.
 - b. ASTM D 3161 - Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method).
 - c. ASTM D 3462 - Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules.
 - d. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - e. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - f. ASTM B 370 - Standard Specification for Copper Sheet and Strip for Building Construction.
 - g. ASTM C 1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
 - h. ASTM D 4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.
 - i. ASTM E 903 - Standard Test Method for Solar Absorption, Reflectance and Transmission of Materials Using Integrating Spheres.
- 6. Cool Roof Rating Council (CRRC).
- 7. ENERGYSTAR.
- 8. National Roofing Contractors Association (NRCA).
- 9. Sheet Metal and Air Conditioning Contractors National Association, 1nc. (SMACNA) - Architectural Sheet Metal Manual.
- 10. U.S. Green Building Council (USGBC): Leadership in Energy and Environmental Design (LEED).

11. Underwriters Laboratory (UL)

- a. UL 790 - Tests for Fire Resistance of Roof Covering Materials.
- b. UL 997 - Wind Resistance of Prepared Roof Covering Materials.

1.03 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D1079 and the glossary of the National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual for definitions of roofing terms related to this section.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, showing compliance with requirements.
- C. Installation Instructions: Manufacturer's installation instructions, showing required preparation and installation procedures.

1.05 QUALITY ASSURANCE

A. QUALIFICATIONS

- 1. Manufacturer Qualifications: Provide all primary roofing products, including shingles, underlayment, leak barrier, and ventilation, by a single manufacturer.
- 2. Installer Qualifications: Installer must be approved by the manufacturer for installation of all roofing products to be installed under this section.

1.06 REGULATORY REQUIREMENTS

- A. Provide a roofing system achieving an Underwriters Laboratories (UL) Class A fire classification.
- B. Provide a roofing system achieving an ENERGYSTAR rating.
- C. Install all roofing products in accordance with all federal, state and local building codes.
- D. All work shall be performed in a manner consistent with current OSHA guidelines.

1.07 PRE-INSTALLATION MEETINGS

- 1. Convene a pre-installation meeting a minimum of two weeks prior to starting work of this section.
 - a. Contractor shall schedule and arrange meeting and meeting place and notify attendees.
 - b. Mandatory Attendees: Roofing installer and manufacturer's steep slope technical representative (not sales agent).
 - c. Optional Attendees: Owner's representative, Architect's representative, prime Contractor's representative.
 - d. Review all pertinent requirements for achieving the warranty specified below and set schedule for final warranty inspection.

1.08 WARRANTY

- 2. Provide manufacturer's standard limited warranty:
 - a. Provide to the Owner a GAF Shingle and Accessory Ltd. Warranty.
 - b. Provide to the Owner a GAF WeatherStopper Golden Pledge Ltd Warranty.
 - c. Provide the Owner with a GAF WeatherStopper Silver Pledge Ltd Warranty.
 - d. Provide the Owner with a GAF Weather Stopper System Plus Ltd Warranty.
 - e. Provide to the Owner a GAF All American Pledge Guarantee.

- f. Provide the Owner with a GAF Cornell ThermaCal Nail Base Roof Insulation Ltd. Warranty.
- i. Warranty Duration: 15 years.

1.09 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened labeled packaging until ready for installation.
- B. Store products in a covered, ventilated area, at a temperature not more than 110 degrees F (43 degrees C); do not store near steam pipes, radiators, or in sunlight.
- C. Store bundles on flat surface to maximum height recommended by manufacturer; store rolls on end.
- D. Store and dispose of solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

2.02 WEATHER CONDITIONS

- A. Proceed with work only when existing and forecasted weather conditions will permit work to be performed in accordance with roofing shingle manufacturer's recommendations.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until roof deck has been properly prepared.
- B. If roof deck preparation is the responsibility of another installer, notify Architect or building owner of unsatisfactory preparation before proceeding.

3.02 REMOVAL OF EXISTING ROOFING

- A. Remove all existing roofing down to the roof deck.
- B. Verify that the deck is dry, sound, clean and smooth, free of depressions, waves and projections.
- C. Cover with sheet metal all holes over 1 inch (25 mm) diameter, cracks over 1/2 inch (12 mm) in width, loose knots and excessively resinous areas.
- D. Replace the damaged deck with new materials.
- E. Clean deck surfaces thoroughly prior to installation of eaves protection membrane and underlayment.

3.03 PREPARATION OF SUBSTRATE

- A. Clean deck surfaces thoroughly prior to installation of leak barrier and roof deck protection.
- B. At areas to receive leak barrier, fill knot holes and cracks with latex filler.

3.04 VENTILATED ROOF INSULATION PANELS INSTALLATION

- A. The structural roof deck shown in the plans shall be smooth and level and free of water or debris before the nail base insulation is installed. Apply vapor retarder if required.
- B. Installation shall follow the GAF written installation instructions.
- C. Fasten with ThermaCal Fasteners to the supporting roof deck shown in the plans.
- D. Protect nail base insulation work from exposure to moisture damage and deterioration, primarily by prompt installation of the roofing, sheet metal and waterproofing work

3.05 INSTALLATION OF UNDERLAYMENT

- A. Install using methods recommended by manufacturer in accordance with local building code. When local codes and application instructions are in conflict, the more stringent requirements shall take precedence.
- B. Eaves:
 - 1. Place eave edge metal flashing tight with fascia boards; lap joints 2 inches (50 mm) and seal with plastic cement; nail at top of flange.
 - 2. On roofs with slope between 2:12 and 4:12, and on all roofs in the north, install leak barrier up the slope from eave edge to 36 inches from the edge or at least 24 inches (610 mm) beyond the interior face of the warm exterior wall, whichever is greater; lap ends 6 inches (150 mm) and bond.
- C. Valleys:
 - 1. Install leak barrier at least 36 inches wide centered on valley; lap ends 6 inches (150 mm) and seal.
 - 2. Where valleys are indicated to be "open valleys", install metal flashing over leak barrier before roof deck protection is installed; DO NOT NAIL THROUGH metal flashing; secure by nailing at 18 inches (457 mm) on center just beyond edge of flashing so that nail heads hold down edge.
- D. Hips and Ridges:
 - 1. Install GAF leak barrier along entire lengths. If ridge vents are to be installed, position the GAF leak barrier so that the ridge slots will not be covered.
- E. Roof Deck:
 - 1. Install one layer of roof deck protection over entire area not protected by eave or valley membrane; run sheets horizontally lapped so water sheds; nail in place.
 - 2. On roofs sloped at more than 4 in 12, lap horizontal edges at least 2 inches (50 mm) and at least 2 inches (50 mm) over eave protection membrane.
 - 3. On roofs sloped between 2 in 12 and 4 in 12, lap horizontal edges at least 19 inches (480 mm) and at least 19 inches (485 mm) over eave protection membrane.
 - 4. Lap ends at least 4 inches (100 mm); stagger end laps of each layer at least 36 inches (915 mm).
 - 5. Lap roof deck protection over valley protection at least 6 inches (152 mm).
- F. Deck-Armor Application
 - 1. Deck-Armor shall be installed over a clean, dry deck.
 - 2. Install Weather Watch or StormGuard Leak Barrier at eaves, valleys, rakes, skylights, dormers and other vulnerable leak areas.
 - 3. Lay Deck-Armor over deck and overlap 3 inch (76 mm) at side laps and 6 inch (152 mm) at end laps.
 - 4. For exposure to rain or snow, overlap 12 inch (305 mm) at end laps.

5. For side and end laps: fasten Deck-Armor 12-inch (305 mm) o.c. (6 inch (152 mm) o.c. for high wind areas).
 6. For middle of the roll: fasten Deck-Armor 24-inch (610 mm) o.c. (12-inch (305 mm) o.c. for high wind areas).
 7. For exposure to rail or snow, completely cover all side laps, end laps and fasteners with tape.
 - a. For long term exposure see complete Deck-Armor installation instructions for side lap detail.
 - b. If the roof may be exposed to high winds, apply tape over all fasteners at the center of the roll to prevent rain or snow from entering at the fasteners.
- G. Penetrations:
1. At vent pipes, install a 24 inch (610 mm) square piece of leak barrier lapping over roof deck protection; seal tightly to pipe.
 2. At vertical walls, install leak barrier extending at least 6 inches (150 mm) up the wall and 12 inches (305 mm) on to the roof surface lapping over roof deck protection.
 3. At skylights and roof hatches, install leak barrier up the sides of the frame and 12 inches (305 mm) on to the roof surface on all sides, lapping over roof deck protection.
 4. At chimneys, install leak barrier around entire chimney extending at least 6 inches (150 mm) up the wall and 12 inches (305 mm) on to the roof surface lapping over roof deck protection.
 5. At rake edges, install metal edge flashing over leak barrier and roof deck protection; set tight to rake boards; lap joints at least 2 inches (50 mm) and seal with plastic cement; secure with nails.
 6. At hips and ridges, install leak barrier along entire lengths. If ridge vents re to be installed, position the leak barrier so that the ridge slots are not covered.

3.06 INSTALLATION OF SHINGLES

- A. Install in accordance with manufacturer's instructions and requirements of local building code.
1. Avoid breakage of shingles by avoiding dropping bundles on edge, by separating shingles carefully (not by "breaking" over ridge or bundles), and by taking extra precautions in temperatures below 40 degrees F (4 degrees C).
 2. Handle carefully in hot weather to avoid damaging shingle edges.
 3. Secure with 4 to 6 nails per shingle; use number of nails required by manufacturer or by code, whichever is greater. Nails must be long enough to penetrate through plywood or OSB, or 3/4 inch (19 mm) into dimensional lumber.
- B. Install hip and ridge shingles as required by the manufacturer. At ridges, install hip and ridge shingles over ridge or ridge vent material.
- C. Make valleys using "open valley" technique:
1. Snap diverging chalk lines on metal flashing, starting at 3 inches (75 mm) each side of top of valley, spreading at 1/8 inch per ft (9 mm per meter) to eave.
 2. Run shingles to chalk line.

3. Trim the last shingle in each course to match chalk line; do not trim shingles to less than 12 inches (305 mm) width.
 4. Apply a 2 inches (50 mm) wide strip of plastic cement under the ends of shingles, sealing to metal flashing.
- A. Make valleys using "closed cut valley" technique:
1. Run the first, and only the first, course of shingles from the higher roof slope across the valley at least 12 inches (305 mm).
 2. Run all courses of shingles from the lower roof slope across the valley at least 12 inches (305 mm) and nail not closer than 6 inches (150 mm) to center of valley.
 3. Run shingles from the upper roof slope into valley and trim 2 inches (50 mm) from center of valley.
- B. Make valleys using the "woven valley" technique.
1. Run shingles from both roof slopes at least 12 inches (305 mm) across center of valley, lapping alternate sides in a woven pattern.
 2. Nail not closer than 6 inches (150 mm) to center of valley.
- C. All penetrations are to be flashed according to GAF, ARMA and NRCA application instructions and construction details.
- D. For skylights, consult the manufacturer of the skylight or roof hatch for specific installation recommendations. Skylights and roof hatches shall be installed with pre-fabricated metal flashings specifically designed for the application of the unit.

3.07 INSTALLATION OF VENTILATION

- A. Code Requirements: Ventilation shall meet or exceed current FHA, HUD and local code requirements.
- B. Ridge Vents:
1. Cut continuous vent slot through sheathing, stopping 6 inches (150 mm) from each end of ridge.
 2. On roofs without ridge board, make slot 2 inches (50 mm) wide, centered on ridge.
 3. On roofs with ridge board, make two slots 1-3/4 inches (89 mm) wide, one on each side.
 4. Install ridge vent material full length of ridge, including uncut areas.
 5. Butt ends of lengths of ridge vent material and join using plastic cement.
 6. Install eave vents in sufficient quantity to equal or exceed the ridge vent area, calculated as specified by manufacturer.
 7. Install ridge shingles over ridge vent material; use nails of specified length; do not drive nails home, leaving 3/4-inch (19 mm) slot open between ridge and roof shingles.
- C. Hip Vents and Rooftop Vents:
1. Install according to manufacturer's instructions.
 2. Install vents in sufficient quantity to equal or exceed the exhaust vent area, calculated as specified by manufacturer.

D. Roof Louvers:

1. Cut vent hole through sheathing as specified by the manufacturer for the type of vent to be installed.
2. Install a 24 inches (610 mm) square leak barrier, centered around the hole.
3. Install according to manufacturer's instructions for flashing vent penetrations.
4. Install eave vents in sufficient quantity to equal or exceed the exhaust vent area, calculated as specified by manufacturer.

E. Powered (Solar and Dual Powered) Ventilators:

1. Cut vent hole through sheathing as specified by the manufacturer for the type of vent to be installed.
2. On rooftop applications, install a 36 inches (610 mm) square leak barrier, centered around the hole.
3. Install according to manufacturer's instructions for flashing vent penetrations.
4. Install eave vents in sufficient quantity to equal or exceed the exhaust vent area, calculated as specified by manufacturer.

F. Whole House Fans:

1. Install at desired locations in ceiling below attic space per manufacturer recommended location and application instructions.

3.08 INSTALLATION OF VENTILATION ACCESSORIES

- A. Chimney Caps: Install per manufacturer recommendations.
- B. Foundation Vents: Install per manufacturer recommendations

3.09 PROTECTION

- A. Stage work progresses so that traffic is minimized over completed roofing.
- B. Protect installed products until completion of project

END OF SECTION

METAL WALL PANELS 07 42 13

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Exposed fastener metal wall panels, with related metal trim and accessories.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. American Architectural Manufacturer's Association (AAMA): www.aamanet.org:
 - 1. AAMA 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) & Zinc-Aluminum Coated Steel Substrates.
 - 2. AAMA 809.2 - Voluntary Specification Non-Drying Sealants.
- B. American Society of Civil Engineers (ASCE): www.asce.org/codes-standards:
 - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International (ASTM): www.astm.org:
 - 1. ASTM A 653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM A 755 - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
 - 3. ASTM A 792/A 792M - Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - 4. ASTM C 645 - Specification for Nonstructural Steel Framing Members.
 - 5. ASTM C 754 - Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
 - 6. ASTM C 920 - Specification for Elastomeric Joint Sealants.
 - 7. ASTM D 1003 - Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics.
 - 8. ASTM D 2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
 - 9. ASTM D 4214 - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.
 - 10. ASTM E 283 - Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - 11. ASTM E 331 - Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
 - 12. ASTM E 1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
 - 13. ASTM E 1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.
 - 14. ASTM E 1980 - Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

1.03 SUBMITTALS

- A. PRODUCT DATA - MANUFACTURER'S data sheets for specified products.
 - 1. Product Test Reports: Indicating compliance of products with requirements, witnessed by a professional engineer.
- B. SHOP DRAWINGS - Submit layouts of metal panels. Include details of each condition of installation, panel profiles, and attachment to building. Provide details at a minimum scale 1-1/2-inch per foot of edge conditions, joints, fastener and sealant placement, flashings, openings, penetrations, and special details. Make distinctions between factory and field assembled work.
 - 1. Indicate points of supporting structure that must coordinate with metal panel system installation.
 - 2. Include data indicating compliance with performance requirements.
 - 3. Include structural data indicating compliance with requirements of authorities having jurisdiction.
- C. SAMPLES
 - 1. Samples for Initial Selection: For each exposed product specified including sealants. Provide representative color charts of manufacturer's full range of colors.
 - 2. Samples for Verification: Provide 12-inch long section of each metal panel profile. Provide color chip verifying color selection.

1.04 QUALITY ASSURANCE

- A. MANUFACTURER QUALIFICATIONS
 - 1. Manufacturer/Source: Provide metal panel assembly and accessories from a single manufacturer providing fixed-base roll forming, and accredited under IAS AC 472 Part B.
 - 2. Manufacturer Qualifications: Approved manufacturer listed in this Section with minimum five years' experience in manufacture of similar products in successful use in similar applications.
- B. INSTALLER QUALIFICATIONS
 - 1. Experienced Installer with minimum of five years' experience with successfully completed projects of a similar nature and scope.
 - 2. Installer's Field Supervisor: Experienced mechanic, able to communicate with Owner, Architect, and installers, supervising work on site whenever work is underway.
- C. PERFORMANCE REQUIREMENTS
 - 1. General: Provide metal wall panel system meeting performance requirements as determined by application of specified tests by a qualified testing facility on manufacturer's standard assemblies.
 - 2. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction. Allow for deflection and design for thermal stresses caused by temperature differences from one side of the panel to the other.
 - 3. Structural Performance: Provide metal panel assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated:
 - a. Wind Loads: Determine loads based on uniform pressure, importance factor, exposure category, and basic wind speed indicated on drawings.
 - b. Deflection Limits: Withstand inward and outward wind-load design pressures in accordance with applicable building code with maximum deflection of 1/180 of the span with no evidence of failure.
 - c. Seismic Performance: Comply with ASCE 7, Section 9, "Earthquake Loads."

4. Air Infiltration: ASTM E1680: Maximum 0.006 cfm/sq. ft. (0.030 L/s per sq. m) at 6.24 lbf/sq. ft. (300 Pa) static-air-pressure difference.
5. Water Penetration: ASTM E1646: No uncontrolled water penetration at a static pressure of 20 lbf/sq. ft. (958 Pa).
6. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, structural quality, Grade 50, Coating Class AZ50 (Grade 340, Coating Class AZM150), prepainted by the coil-coating process per ASTM A 755/A 755M.
7. Light Transmitting Panel: Manufacturer's standard UV-resistant translucent panel, formed to metal panel profile, white, with haze value of not less than 90 percent when measured per ASTM D 1003.

1.05 SYSTEM DESCRIPTION

A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

1.07 WARRANTY

A. Special Manufacturer's Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail in materials and workmanship within one year from date of Substantial Completion.

B. Special Panel Finish Warranty: On Manufacturer's standard form, in which Manufacturer agrees to repair or replace metal panels that evidence deterioration of factory-applied finish within [25] years from date of Substantial Completion, including:

1. Fluoropolymer Two- Coat System:
 - a. Color fading in excess of 10 Hunter units per ASTM D 2244.
 - b. Chalking in excess of No. 8 rating per ASTM D 4214.
 - c. Failure of adhesion, peeling, checking, or cracking.

PART 2 PRODUCTS

2.01 MATERIALS

A. LARGE TAPERED-RIB-PROFILE, Exposed Fastener Metal Panels: Structural metal panel consisting of formed metal sheet with trapezoidal major ribs with intermediate stiffening ribs symmetrically placed between major ribs, installed by lapping edges of adjacent panels.

1. Basis of Design: Ceco, PBR Panel
2. Coverage Width: 36 inches.
3. Major Rib Spacing: 12 inches on center.
4. Rib Height: 1-1/4 inch.
5. Nominal Coated Thickness: 26 gage.
6. Panel Surface: Smooth.
7. Color: As selected by Architect from manufacturer's standard colors to match existing panels.

B. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:

1. Ceco, an NCI Building Systems company; Rocky Mount, NC, www.cecobuildings.com
2. Berridge Manufacturing; San Antonio, TX, www.berridge.com
3. Centra, a Nucor company; Lewisville, TX, www.centria.com

4. Pac-Clad, a Carlisle company; Tyler, TX, www.pac-clad.com

2.02 FINISHES

- A. General: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- B. Modified Silicone-Polyester Two-Coat System: 0.20 – 0.25 mil primer with 0.7 – 0.8 mil color coat.
- C. Basis of Design: Modified Silicone-Polyester Two-Coat System.
- D. Interior Finish: 0.5 mil total dry film thickness consisting of primer coat and wash coat of manufacturer's standard light-colored acrylic or polyester backer finish.

2.03 ACCESSORIES

- A. General: Provide complete metal panel assembly incorporating base, corner, and opening trims and miscellaneous flashings, in manufacturer's standard profiles. Provide required fasteners, closure strips, support plates, and sealants as indicated in manufacturer's written instructions.
- B. Flashing and Trim: Match material, thickness, and finish of metal panel face sheet.
- C. Panel Fasteners: Self-tapping screws and other acceptable fasteners recommended by metal panel manufacturer.
- D. Exposed Fasteners: Long life fasteners with EPDM or neoprene gaskets, with heads matching color of metal panels by means of factory-applied coating.
- E. Joint Sealers: Manufacturer's standard or recommended liquid and preformed sealers and tapes, and as follows:
 1. Tape Sealers: Manufacturer's standard non-curing butyl tape, AAMA 809.2.
- F. Steel Sheet Miscellaneous Framing Components: ASTM C 645, with ASTM A 653/A 653M, G60 (Z180) hot-dip galvanized zinc coating.

2.04 FABRICATION

- A. General: Provide factory fabricated and finished metal panels and accessories meeting performance requirements, indicated profiles, and structural requirements.
- B. Panel Lengths: Form panels in continuous lengths for full length of detailed runs, except where otherwise indicated on approved shop drawings.
- C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions, approved shop drawings, and project drawings. Form from materials matching metal panel substrate and finish.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements
- B. Examination of Conditions: Examine metal panel system substrate and supports with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal panel installation.
- C. Inspect metal panel support substrate to determine if support components are installed as indicated on approved shop drawings. Confirm presence of acceptable supports at recommended spacing to match installation requirements of metal panels.
- D. Panel Support Tolerances: Confirm that panel supports are within tolerances acceptable to metal panel system manufacturer but not greater than the following:
 1. 1/4 inch in 20 foot in any direction.

- E. Correct out-of-tolerance work and other deficient conditions prior to proceeding with metal panel system installation.

3.02 DELIVERY, STORAGE AND HANDLING

- A. Protect products of metal panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage. Protect panels and trim bundles during shipping.
- B. Deliver, unload, store, and erect metal panel system and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.
- C. Store in accordance with Manufacturer's written instructions. Provide wood collars for stacking and handling in the field.

3.03 PREPARATION

A. CONSTRUCTION / INSTALLATION

- 1. INSTALL in accordance with approved construction drawings, shop drawings and approved manufacturer's literature, installation instructions and the following requirements.
- 2. METAL PANEL INSTALLATION
 - a. Exposed Fastener Metal Wall Panels: Install weathertight metal panel system in accordance with manufacturer's written instructions, approved shop drawings, and project drawings. Install metal panels in orientation, sizes, and locations indicated, free of waves, warps, buckles, fastening stresses, and distortions. Anchor panels and other components securely in place. Provide for thermal and structural movement.
 - b. Panel Sealants: Install manufacturer's recommended tape sealant at panel sidelaps and endlaps.
 - c. Panel Fastening: Attach panels to supports using screws, fasteners, and sealants recommended by manufacturer and indicated on approved shop drawings.
 - d. Fasten metal panels to supports at each location indicated on approved shop drawings, with spacing and fasteners recommended by manufacturer.
 - e. Provide weatherproof jacks for pipe and conduit penetrating metal panels of types recommended by manufacturer.
 - f. Dissimilar Materials: Where elements of metal panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.
- 3. ACCESSORY INSTALLATION
 - a. General: Install metal panel trim, flashing, and accessories using recommended fasteners and joint sealers, with positive anchorage to building, and with weather tight mounting. Coordinate installation with flashings and other components.
 - b. Install components required for a complete metal panel assembly, including trim, copings, flashings, sealants, closure strips, and similar items.
 - c. Comply with details of assemblies utilized to establish compliance with performance requirements and manufacturer's written installation instructions.
 - d. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently weather resistant.
 - e. Joint Sealers: Install joint sealers where indicated and where required for weathertight performance of metal panel assemblies, in accordance with manufacturer's written instructions
 - f. Prepare joints and apply sealants per requirements of Division 07 Section "Joint Sealants."

3.04 FIELD QUALITY CONTROL

A. SITE TESTS, INSPECTION

1. Testing Agency: Owner will engage an independent testing and inspecting agency acceptable to Architect to perform field tests and inspections and to prepare test reports.
- 3.05 ADJUSTING, CLEANING, AND PROTECTION OF WORK
- A. Remove temporary protective films immediately in accordance with metal panel manufacturer's instructions. Clean finished surfaces as recommended by metal panel manufacturer.
 - B. Replace damaged panels and accessories that cannot be repaired to the satisfaction of the Architect.

PART 4 SCHEDULES – NOT USED

END OF SECTION

ROOF ACCESSORIES 07 72 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: This section includes information pertaining to prefabricated pipe penetration boots.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. SMACNA "Architectural Sheet Metal Manual"
- B. "NRCA Roofing and Waterproofing Manual"

1.03 SUBMITTALS

- A. PRODUCT DATA - Submit manufacturer's technical product data, rough-in diagrams, details, installation instructions and general product recommendations.
- B. SHOP DRAWINGS - Show fabrication and installation details. Indicate dimensions, weights, loadings, required clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments to other Work.

1.04 QUALITY ASSURANCE

A. QUALIFICATIONS

- 1. HEAT/SMOKE VENT COMPLIANCE LABELS: Provide units which have been tested, listed and labeled as follows:
 - a. CONSTRUCTION/OPERATION: UL labeled.
 - b. FIRE RESISTANCE OF LIDS: UL Class "A".
- 2. STANDARDS: Comply with SMACNA "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap-flashing to coordinate with type of roofing indicated. Comply with "NRCA Roofing and Waterproofing Manual" details for installation of units.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS / EQUIPMENT

A. GENERAL PRODUCT REQUIREMENTS:

- 1. PROVIDE MANUFACTURERS' STANDARD UNITS, modified as necessary to comply with requirements. Shop fabricate each unit to the greatest extent possible.

B. PREFABRICATED PIPE PENETRATION BOOTS:

- 1. GENERAL: Install self-flashing pipe penetration boots, which will be provided by each trade contractor for their penetrations, at all points where pipes 12" in diameter or smaller are penetrating the roof. The system to include an aluminum base flange, compression molded rubber cap and stainless-steel snap-lock clamps.
- 2. MANUFACTURER: Subject to compliance with requirements, provide prefabricated pipe penetration boots by the following (or approved equal):

- a. Roof Products and Systems (RPS); <https://www.rpscubs.com/>

2.02 FINISHES – NOT USED

2.03 ACCESSORIES

- A. FASTENERS: Same metal as metals be in the manufacturer or nonmagnetic stainless steel or other noncorrosive metal as recommended by manufacturer. Match the finish of exposed fasteners with finish of material being fastened.
- B. GASKETS: Tubular or fingered design of neoprene or polyvinyl chloride, or block design of sponge neoprene.
- C. BITUMINOUS COATING: FS TT-C-494 or SSPC-Paint 12, solvent type bituminous mastic, nominally free of sulfur, compounded for 15 mil dry film thickness per coating.
- D. MASTIC SEALANT: Polyisobutylene; nonhardening, non-skinning, nondrying, nonmigrating sealant.
- E. ELASTOMERIC SEALANT: Generic type recommended by unit manufacturer, which is compatible with joint surfaces; comply with FS TT-S-0227, TT-S-00230, or TT-S-001543.
- F. ROOFING CEMENT: ASTM D2822 / D2822M, asphaltic.

2.04 FABRICATION – NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING – NOT USED

3.03 PREPARATION – NOT USED

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

- 1. GENERAL: Comply with manufacturer's instructions and recommendations. Coordinate with installation of roof deck and other substrates to receive accessory units, and with vapor barriers, roof insulation, roofing and flashing; as required to ensure that each element of the work performs properly, and that combined elements are waterproof and weathertight. Anchor units securely to supporting structural substrates, adequate to withstand lateral and thermal stresses as well as inward and outward loading pressures.
 - a. Except as otherwise indicated install roof accessory items in accordance with specifications and construction details of "NRCA Roofing and Waterproofing Manual".

- B. ISOLATION: Where metal surfaces of units are to be installed in contact with non-compatible metal or corrosive substrates, including wood, apply bituminous coating on concealed metal surfaces, or provide other permanent separation.

- C. FLANGE SEALS: Except as otherwise indicated, set flanges of accessory units in a thick bed of roofing cement, to form a seal.

3.05 COORDINATION WITH OTHER WORK – NOT USED

3.06 FIELD QUALITY CONTROL – NOT USED

3.07 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. CLEAN exposed metal and plastic surfaces in accordance with manufacturer's instructions. Touch up damaged metal coatings.

PART 4 SCHEDULES – NOT USED

END OF SECTION

FIRESTOPPING 07 84 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Firestopping is the process of furnishing and installing a material, or combination of materials, in various constructions to maintain an effective barrier against the spread of flame, smoke, and gases and to retain the integrity of time-rated construction. The section includes firestopping of through penetrations in rated assemblies, fire resistive joint systems, perimeter fire containment systems, smoke seals, and compartmentalized areas.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. Underwriters Laboratories Fire Resistance Directory; latest edition.
 - 1. Through Penetration Firestop Systems
 - 2. Joint Systems
 - 3. Fill, Void or Cavity Materials
 - 4. Firestop Devices
 - 5. Forming Materials
 - 6. Wall Opening Protective Materials
- B. National Fire Protection Association NFPA 101: Life Safety Code"; latest edition.
- C. Factory Mutual Approvals FM 4991: Standard for Approval of Firestop Contractors"; latest edition.
- D. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; latest edition.
- E. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; latest edition.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; latest edition.
- G. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; latest edition.
- H. ASTM E1399 / E1399M - Standard Test Method for Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems; latest edition.
- I. UL263 - Standard for Fire Tests of Building Construction and Materials; latest edition.
- J. UL723 - Standard for Test for Surface Burning Characteristics of Building Materials; latest edition.
- K. UL2079 – Standard for Tests for Fire Resistance of Building Joint Systems; latest edition.

1.03 SUBMITTALS

- A. PRODUCT DATA - MANUFACTURER'S CATALOG DATA for each type of materials and prefabricated devices, including descriptions sufficient to identify them on the job, and instructions for installation.
- B. SHOP DRAWINGS - Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance ratings. COMPLETE CONSTRUCTION DETAILS showing proposed material, reinforcement,

anchorage, fastenings, and method of installation. These shall accurately reflect job conditions pursuant to paragraph, "Examination of Work by Contractor."

C. CERTIFICATES:

1. Product certificates signed by firestop system manufacturer certifying material compliance with applicable code and specified performance characteristics
2. Certification of Installer's Qualifications.

1.04 QUALITY ASSURANCE

A. QUALIFICATIONS

1. INSTALLER QUALIFICATIONS: Experience in performing work of this section who is qualified by the firestopping manufacturer as having been provided the necessary training to install firestop products in accordance with specified requirements.
2. Products/Systems: Provide firestopping systems that comply with the following requirements:
 - (A) Firestopping tests are performed by a qualified, testing and inspection agency. A qualified testing and inspection agency are UL, or another agency performing testing and follow-up inspection services for firestop system acceptable to authorities having jurisdiction.
 - (B) Firestopping products bear the classification marking of qualified testing and inspection agency.
3. Obtain firestop systems for each type of penetration or joint opening and construction condition indicated from a single manufacturer.

B. CERTIFICATIONS

1. CERTIFICATES OF CONFORMANCE or compliance accompanied by classification by a nationally recognized testing authority or by other supporting evidence satisfactory to the Architect-Engineer, that the material or combination of materials used meet the requirements for each applicable ASTM test.
2. Contractor's and installer's certification that products are installed in accordance with Contract Documents, based on inspection and testing specified as part of Field Quality Control.
3. Certificates of compliance from authority having jurisdiction indicating approval of firestops, fire containments, and construction joints.

1.05 SYSTEM DESCRIPTION

A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

B. DESIGN / PERFORMANCE REQUIREMENTS - Firestopping shall be used in specific locations, but not limited to the following:

1. Provide products that upon curing, do not re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during and after construction.
2. Provide firestop sealants sufficiently flexible to accommodate motion such as pipe vibration, water hammer, thermal expansion and other normal building movement without damage to the seal.
3. Pipe insulation shall not be removed, cut away or otherwise interrupted through wall or floor openings. Provide products appropriately tested for the thickness and type of insulation utilized.
4. Fire rated mechanical cable pathway devices shall be the preferred product and shall be installed in all locations where frequent cable moves, add-ons and changes will occur.

5. When mechanical cable pathways are not practical, openings within walls and floors designed to accommodate voice, data and video cabling shall be provided with re-entenable products specifically designed for retrofit.
 6. Duct, cables, conduit, and piping penetrations through floor slab and through time-rated partitions or fire walls. Unless otherwise specified or shown on the drawings, assume that all floor slabs and that all walls or partitions which have, or are part of an enclosure having, fire-rated doors will be considered as time rated.
 7. Openings between floor slabs and curtain walls, including inside hollow curtain walls at the floor slab.
 8. Penetration of vertical service shafts.
 9. Openings and/or penetrations through smoke barriers and special compartmentalized areas.
 10. Expansion joints in walls, floors and wall-and-floor slab assemblies.
 11. Provide fire-resistive joint sealants sufficiently flexible to accommodate movement such as thermal expansion and other normal building movement without damage to the seal.
 12. Provide fire-resistive joint sealants designed to accommodate a specific range of movement and tested for this purpose in accordance with a cyclic movement test criterion as outlined in Standards, ASTM E-1399 / E1399M, ASTM E-1966 or ANSI/ UL 2079.
 13. Provide fire-resistive joint systems subjected to an air leakage test conducted in accordance with Standard, ANSI/ UL2079 with published L-Ratings for ambient and elevated temperatures as evidence of the ability of the fire-resistive joint system to restrict the movement of smoke.
- 1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

- A. **FOAMED-IN-PLACE FIRESTOPPING SEALANT:** Two-part, foamed-in-place, silicone sealant formulated for use as part of a through-penetration firestop system for filling openings around cables, conduit, pipes and similar penetrations through walls and floors.
 1. **MANUFACTURERS:** Subject to compliance with requirements, provide products of the following or acceptable equivalent:
 - (A) "CP 620 Fire Foam", Hilti Corporation.
- B. **ONE-PART FIRESTOPPING SEALANT:** One-part elastomeric sealant formulated for use as part of a through-penetration firestop system for sealing openings around cables, conduit, pipes and similar penetrations through walls and floors.
 1. **MANUFACTURERS:** Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - (A) "3M Fire Barrier CP 25WB+ Caulk", Electrical Products Div./3M.
 - (B) "Nelson CLK Adhesive Firestop Sealant" Nelson Firestop Products.
- C. **FIRESTOP PUTTY:** Intumescent, non-hardening, water resistant putties containing no solvents, inorganic fibers or silicone compounds.
 1. **MANUFACTURERS:** Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - (A) "SpecSeal Series SSP Firesop Putty", Specified Technologies Inc.
 - (B) "Nelson FSP Firestop Putty", Nelson Firestop Products.
 - (C) "CP 618 Firestop Putty Stick", Hilti Corporation.

- D. WALL OPENING PROTECTIVE MATERIALS: Intumescent, non-curing pads or inserts for protection of electrical switch and receptacle boxes to reduce horizontal separation to less than 24".
 - 1. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - (A) "SpecSeal Series SSP Firestop Putty Pads", Specified Technologies, Inc.
 - (B) "CP 617 Firestop Putty Pad", Hilti Corporation.
- E. SAFING INSULATION: Products used to seal openings between floor slabs and curtain walls shall be capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste when subject to ASTM E119 time-temperature fire conditions.
 - 1. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - (A) "Thermafiber"; United States Gypsum.
 - (B) "FBX"; Fibrex.
 - (C) "Dendamix"; American Sprayed Fibers, Inc.
- F. MINERAL WOOL: Basalt wool and organic binder which is non-combustible and asbestos free. Provide technical information for review.
- G. MISCELLANEOUS MATERIALS:
 - 1. Provide forming, joint-fillers, packing and other accessory materials required for installation of firestopping sealants as applicable to installation conditions.

2.02 FINISHES – NOT USED

2.03 ACCESSORIES – NOT USED

2.04 FABRICATION – NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements
- B. Examination of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

3.02 DELIVERY, STORAGE AND HANDLING

- A. Deliver firestopping products to Project site in original, unopened containers or packages with intact and legible manufacturer's labels identifying product and manufacturer, date of manufacture; lot number; shelf life, if applicable; qualified testing and inspection agency's classification marking; and mixing instructions for multicomponent materials.
- B. Store and handle materials for firestopping products to prevent their deterioration or damage due to moisture, temperature changes, contaminants or other causes.

3.03 PREPARATION

A. JOB CONDITIONS

- 1. Do not install firestopping products when ambient or substrate temperatures are outside limitations recommended by manufacturer.
- 2. Do not install firestopping products when substrates are wet due to rain, frost, condensation, or other causes.
- 3. Maintain minimum temperature before, during, and for a minimum 3 days after installation of materials.
- 4. Do not use materials that contain flammable solvents.

5. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
6. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
7. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings. Schedule installation of CAST IN PLACE firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.

B. SURFACE PREPARATIONS

1. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, scale, laitance, rust, release agents, water repellents, and any other substances that may inhibit optimum adhesion.
2. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
3. Do not proceed until unsatisfactory conditions have been corrected.

C. PROTECTION

1. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.
2. Protect materials from damage on surfaces subjected to traffic.

D. CONSTRUCTION / INSTALLATION

1. INSTALL in accordance with approved construction drawings, shop drawings and approved manufacturer's literature, installation instructions and the following requirements:
 - (A) FIRESTOPPING MATERIALS shall completely fill the void space regardless of geometric configuration, subject to tolerances established by the manufacturer when intumescent materials are used.
 - (B) APPLY FIRESTOPPING MATERIALS at penetrations of insulated pipes and ducts prior to application of the insulation. If insulation is already in place, remove it at the penetration prior to application of the firestopping materials, except where intumescent materials are used, and removal is not necessary per manufacturer's instructions. Insulation that meets the requirements of paragraph, "FIRE ENDURANCE RATED PRODUCTS," need not meet this requirement.
 - (C) FIRESTOPPING FOR FILLING VOIDS in floors in which the smallest dimension is 4" or more shall support the same load as the floor is designed to support or shall be protected by a permanent barrier to prevent loading or traffic on the fire-stopped area.

E. COORDINATION WITH OTHER WORK

1. Corridor partitions, smoke-stop partitions, horizontal exit partitions, exit enclosures, and fire walls as indicated on drawings shall be permanently identified with a continuous red line and signs or stenciling. Such identification shall be above any decorative ceiling and in concealed spaces. Wording as follows: "Fire and Smoke Barrier - Protect All Openings."
2. During construction, provide and maintain either the permanent identification specified above or other suitable temporary identification.

3.04 FIELD QUALITY CONTROL

A. SITE TESTS, INSPECTION

1. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.

2. Keep areas of work accessible until inspection by applicable code authorities.
 3. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or another recognized standard.
 4. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.
- B. APPROVED INSTALLATION INSTRUCTIONS shall be present at each work area prior to the beginning work and a test installation shall be produced for quality check by the Architect-Engineer or his designated representative. The test installation shall be subject to inspection and/or test for conformance with contract requirements. Periodic quality checks shall be performed at the discretion of the Architect-Engineer, and should installation prove to be substandard, all firestopping installed up to that time not meeting approved standards shall be replaced at no additional cost to the Owner.
- C. AREA OF WORK shall remain available for inspection by the Architect-Engineer or his designated representative before and after application of firestopping.
- D. NOTIFICATION: Notify the Architect-Engineer or his designated representative at least 24 hours prior to installation of firestopping in each area to allow opportunity for inspection.
- 3.05 ADJUSTING, CLEANING, AND PROTECTION OF WORK
- A. ACCEPTANCE OF WORK: As work on each floor is completed, remove materials, litter, and debris. All work shall be inspected and accepted by the Architect-Engineer or his designated representative before materials and equipment are moved to the next scheduled work area.
- B. LABELING: Upon completion, affix label to or adjacent to each fire-stopped penetration in time-rated assemblies indicating material and proper replacement if later disturbed

PART 4 SCHEDULES

4.01 FIRESTOPPING

GENERAL DESCRIPTION OF JOINT CONSTRUCTION & LOCATION WHERE FIRESTOPPING IS TYPICALLY APPLIED:

- | | |
|---|--|
| A. Foamed-In-Place Firestopping Sealant | Through penetrations in fire-resistance-rated floor and wall assemblies involving multiple pipes, conduits, etc. |
| B. One-Part Firestopping Sealant | Through penetrations in fire-resistance-rated floor and wall assemblies. |
| C. Firestop Putty | Involving single pipes, conduits where joint widths are narrow and/or uniform width. |
| D. Wall Opening Protective Materials | Partial penetrations of fire and smoke rated partition walls |
| E. Safing Insulation | Areas between tops of masonry partition walls and underside of floor and roof deck. |
| F. Mineral Wood | Areas between tops of masonry partition walls and underside of floor and roof deck, joist and beam penetrations of fire and smoke rated partition walls. |

END OF SECTION

JOINT SEALERS 07 91 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Sealant shall be installed to make joints airtight, watertight, and sound tight at interior and exterior spaces.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; latest edition.
- B. ASTM C1193 - Standard Guide for Use of Joint Sealants; latest edition.

1.03 SUBMITTALS

- A. PRODUCT DATA Manufacturer's specifications, recommendations and installation instructions, and joint preparation.
- B. SHOP DRAWINGS – NOT USED
- C. SAMPLES - Each type and color of sealer, backing material 6" long of required sizes.
- D. WARRANTY
 - 1. All caulking and sealant work shall be warranted, in writing, against all defect of material and application for a period of five years after date of acceptance.
 - 2. Submit warranty in accordance with related requirements of "General Conditions" and "Supplementary General Conditions".
 - 3. Any failures that may occur within this period due to defective material and/or application shall, upon written notice of same, be repaired or replaced with proper materials and/or labor, as approved by the Architect-Engineer, at no additional cost to the Owner.

1.04 QUALITY ASSURANCE

- A. QUALIFICATIONS
 - 1. INSTALLER QUALIFICATIONS: Specializing in application of sealants with a minimum of 3 years' experience in applying specified products and approved by manufacturer.
 - 2. SINGLE SOURCE RESPONSIBILITY: Obtain materials from single manufacturer for each different product.
- B. CERTIFICATIONS - Letter of certification from manufacturers of joint sealers attesting that their products comply with specification requirements and are suitable for the use indicated.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.
- B. DESIGN / PERFORMANCE REQUIREMENTS
 - 1. Areas to receive sealant but not limited to:
 - a. All exterior and interior joints, cracks, holes and penetrations where air, water or sound could penetrate.
 - b. Interior and exterior control and expansion joints and joints between dissimilar materials.
 - c. Joints around pipes, conduits or ducts which penetrate walls and partitions.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS / EQUIPMENT

- A. **ELASTOMERIC JOINT SEALANTS:** Subject to compliance with requirements, provide one of the following or acceptable equivalent:
1. **TWO-PART NONSAG POLYURETHANE ELASTOMERIC SEALANT:** ASTM C-920 Type M; Grade NS; Class 25.
 - a. **MANUFACTURERS:** Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - i. "MasterSeal NP 2"; BASF
 - ii. "DynaTrol II"; Pecora Corp.
 - iii. "Sikaflex 2c NS"; Sika Corp.
 - iv. "Dymeric 240"; Tremco Corporation
 2. **ONE-PART NEUTRAL-CURING LOW-MODULUS SILICONE SEALANT:** FS TT-S-00230C, Class A; ASTM C-920 Type S, Grade NS, Class 25 Low Modulus.
 - a. **MANUFACTURERS:** Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - i. "MasterSeal NP 520"; BASF
 - ii. "Pecora 864"; Pecora Corp.
 - iii. "Dow Corning 790"; Dow Corning
 - iv. "Spectrem 1"; Tremco Corporation
 3. **SINGLE-COMPONENT, MOISTURE-CURE, POLYURETHANE (HYBRID) SEALANT:** FS TT-S-00230C CLASS A, TYPE II; ASTM C-920, Type S, Grade NS, Class 35, Uses NT, M, A, O; non-staining, non-bleeding, color as selected.
 - a. **MANUFACTURERS:** Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - i. "MasterSeal NP 150"; BASF
 - ii. "Dynomix FC"; Tremco
 - iii. "3M 760 UV"; 3M

2.02 FINISHES

- A. **COLORS:** Provide color of exposed joint sealers as selected by Architect-Engineer from manufacturer's standard colors.

2.03 ACCESSORIES

- A. **JOINT SEALANT BACKING:**
1. **BACKER ROD:** Either flexible, open-cell polyurethane foam or non-gassing closed-cell polyethylene foam as recommended by sealant manufacturer.
 2. **BOND-BREAKER TAPE:** Pressure sensitive adhesive polyethylene tape for preventing bond to third surface of joint.
- B. **PRIMER:** As recommended by sealer manufacturer and as determined from field mock-up.
- C. **CLEANERS:** Non-staining, chemical cleaner acceptable to manufacturer of sealant and sealant backing materials and not harmful to substrates and adjacent materials.
- D. **MASKING TAPE:** Pressure sensitive adhesive paper tape compatible with sealant and adjacent surfaces.

2.04 FABRICATION - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling, and Unloading

1. DELIVER MATERIALS to project site in original unopened containers or packages with manufacturer's labels, product name and designation, color, expiration period for use, pot life, curing time and mixing instructions for multicomponent materials.
2. STORE AND HANDLE MATERIALS to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes

3.03 PREPARATION

A. JOB CONDITIONS

1. ENVIRONMENTAL CONDITIONS: Do not proceed with installation when ambient and substrate temperature conditions are outside limits permitted by the manufacturer or below 40°F (4.4°C) or when substrates are wet.
2. JOINT DIMENSIONS: Do not proceed with installation when joint widths are more than allowed by the manufacturer.

B. SURFACE PREPARATIONS

1. SURFACE CLEANING OF JOINTS: Comply with recommendations of sealant manufacturer and the following:
 - a. Clean joint surfaces, using cleaner as necessary, to be free of dust, dirt, oil, grease, rust, lacquers, laitance, release agents, moisture, or other matter which might interfere with adhesion of sealant.
 - b. Porous surfaces shall be cleaned by brushing, grinding, blast cleaning (sand or water), mechanical abrading, or a combination of these methods to provide clean, sound, and dry surface for sealant.
2. JOINT PRIMING: Apply primer, and where indicated, to comply with sealer manufacturer's recommendations. Do not allow primer spillage or migration onto adjoining surfaces.
3. MASKING TAPE: Tape where required to assure neat sealant lines and to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. GENERAL: Comply with joint sealer manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
2. ELASTOMERIC SEALANT INSTALLATION STANDARD: ASTM C1193 for use of joint sealants as applicable to materials, applications and conditions indicated.
3. LATEX SEALANT INSTALLATION STANDARD: ASTM C790 for use of latex sealants.
4. INSTALLATION OF SEALANT BACKINGS:
 - a. JOINT-FILLERS: Install backing at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability. Do not leave gaps between ends; do not stretch, twist, puncture, or tear; and remove damaged and absorbent backing which have become wet prior to sealant application and replace with dry material.
 - b. INSTALL BOND BREAKER TAPE between sealants and back of joints to prevent

third-side adhesion of sealant.

- 5. **INSTALLATION OF SEALANTS:** Apply sealants by proven techniques that result in completely filling recesses making sure sealant is deposited in uniform, continuous bead without gaps and pockets.
 - 6. **TOOLING OF NONSAG SEALANTS:** Immediately after application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets and to ensure contact and adhesion of sealant with sides of joint. Use tooling agents approved by sealant manufacturer. Concave joint configuration per Figure 6A in ASTM C1193, unless otherwise indicated.
 - B. **COORDINATION WITH OTHER WORK:** Verify that installed work is complete and ready to receive joint sealers.
- 3.05 **FIELD QUALITY CONTROL – NOT USED**
- 3.06 **ADJUSTING, CLEANING, AND PROTECTION OF WORK**
- A. **PROTECT JOINT SEALERS** during and after curing period from contact with contaminating substances or from damage. If damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials indistinguishable from original work.
 - B. **CLEAN OFF EXCESS SEALANTS** or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

PART 4 SCHEDULES

Exterior and interior joints of metal; between metal and glass.	Two-part Nonsag Polyurethane Elastomeric Or One-part Hybrid
Interior joints in field-painted vertical and overhead surfaces at perimeter of door frames, gypsum drywall, plaster; and all other interior locations not indicated otherwise.	One-part Neutral-curing Low-Modulus Silicone Or One- Part Hybrid

END OF SECTION

DIVISION - 8 OPENINGS

08 11 13 STEEL DOORS AND FRAMES

08 14 00 WOOD DOORS – FACTORY FINISH

08 41 13 ALUMINUM ENTRANCES AND STOREFRONT

08 71 00 FINISH HARDWARE

08 74 00 ACCESS CONTROL

08 80 00 GLASS AND GLAZING

END OF SECTION

STEEL DOORS AND FRAMES 08 11 13

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Hollow metal doors and frames located on the project and identified in the schedules in the documents.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. Steel Door Institute "Recommended Specifications: Standard Steel Doors and Frames" (SDI-100) and as herein specified. ANSI/SDI A250.8; latest edition.
- B. ANSI / BHMA A156.115 "Hardware Preparation in Steel Doors and Steel Frames"; latest edition.
- C. ASTM A153 / A153M "Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware"; latest edition.
- D. ASTM A568 / A568M "Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for"; latest edition.
- E. ASTM A1008 / A1008M "Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable"; latest edition.
- F. ASTM A1011 / A1011M "Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability and Ultra High Strength"; latest edition.
- G. ASTM C1363 – 11 "Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus"; latest edition.
- H. HMMA 820 "Hollow Metal Frames"

1.03 SUBMITTALS

- A. PRODUCT DATA - Submit manufacturer's technical product data substantiating that products comply with requirements.
- B. SHOP DRAWINGS - Submit for fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.
 - 1. Provide schedule of doors and frames using same reference numbers for details and openings as those on contract drawings.
 - 2. Indicate coordination of glazing frames and stops with glass and glazing requirements.

1.04 QUALITY ASSURANCE

- A. QUALIFICATIONS – NOT USED
- B. CERTIFICATIONS – NOT USED

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS / EQUIPMENT

A. GENERAL:

1. **HOT-ROLLED STEEL SHEETS AND STRIP:** Commercial quality carbon steel, pickled and oiled, complying with ASTM A1011 / A1011M and ASTM A568 / A568M.
2. **COLD-ROLLED STEEL SHEETS:** Commercial quality carbon steel, complying with ASTM A1008 / A1008M and ASTM A568 /A568M.

B. STANDARD STEEL DOORS

1. **METAL DOORS** of types and styles indicated on drawings or schedules.
 - a. **ASTRAGALS** shall be provided at all fire rated and exterior pairs of doors. Provide astragals equivalent to Pemko series 314 N.
2. **MANUFACTURERS:** See list of acceptable manufacturers below.

C. STANDARD STEEL FRAMES:

1. **PROVIDE METAL FRAMES** for doors, and other openings, of types and styles as shown on drawings and schedules. Conceal fastenings, unless otherwise indicated. Fabricate frames of minimum 16 gage cold-rolled furniture steel, unless specified otherwise.
 - a. **INTERIOR DOOR FRAMES:** SDI – 100, Level II, 16-gauge
 - b. **EXTERIOR DOOR FRAMES:** SDI – 100, Level III, 14-gauge
 - c. **FABRICATE FRAMES** with mitered corners and welded construction.
 - d. **DOOR SILENCERS:** Except on weather-stripped frames, drill stops to receive 3 silencers on strike jambs of single-swing frames and 2 silencers on heads of double-swing frames.
 - e. **PLASTER GUARDS:** Provide 26-gage steel plaster guards or mortar boxes, welded to frame, at back of finish hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.
2. **MANUFACTURERS:** See list of acceptable manufacturers below.

D. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:

- a. American Steel Products; Swainsboro, GA, <http://www.amsteelpro.com/>
- b. Amweld Building Products, Inc.; Garrettsville, OH, <https://absupply.net/Amweld.aspx>
- c. Ceco Door Products; Brentwood, TN, <https://www.cecodoor.com/en/>
- d. Mesker Door, Huntsville, AL, <https://meskerdoor.com/>
- e. Metal Products, Inc., Corbin, KY, <https://www.metalproductsinc.com/>
- f. Republic Builders Products; McKenzie, TN, <http://republicdoor.com/>
- g. SteelCraft; Cincinnati, OH, <https://www.steelcraft.com/>

2.02 FINISHES

A. SHOP APPLIED PAINT:

1. **PRIMER:** Rust-inhibitive enamel or paint, either air-drying or baking, suitable as a base for specified finish paints.

B. SITE APPLIED PAINT:

1. **FINISH:** Painting as specified.

2.03 ACCESSORIES

- #### **A. SUPPORTS AND ANCHORS:** Fabricate of not less than 18 gage galvanized sheet steel.

- B. INSERTS, BOLTS AND FASTENERS: Manufacturer's standard units, except hot-dip galvanize items to be built into exterior walls, complying with ASTM A153 / A153M, Class C or D as applicable.

2.04 FABRICATION

A. Shop Assembly

1. FABRICATE STEEL DOOR and frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at project site. Comply with SDI-100 requirements as follows:
 - a. INTERIOR DOORS: SDI-100, Level II, heavy-duty, Model 2, minimum 18-gage faces.
 - b. EXTERIOR DOORS: SDI-100, Level III, extra heavy-duty, Model 2, minimum 16-gage faces.
2. FABRICATE EXPOSED FACES of doors and panels, including stiles and rails of non-flush units, from only cold-rolled steel.
3. FABRICATE FRAMES, concealed stiffeners, reinforcement, edge channels, louvers and moldings from either cold-rolled or hot-rolled steel (at fabricator's option).
4. FABRICATE EXTERIOR DOORS, panels, and frames from galvanized sheet steel. Close top and bottom edges of exterior doors as integral part of door construction or by addition of minimum 16-gage inverted steel channels.
5. EXPOSED FASTENERS: Unless otherwise indicated, provide countersunk flat Phillips heads for exposed screws and bolts.
6. THERMAL-RATED (INSULATING) ASSEMBLIES: At exterior locations and elsewhere as shown or scheduled, provide doors which have been fabricated as thermal insulating door and frame assemblies and tested in accordance with ASTM C1363.
 - a. Unless otherwise indicated, provide thermal-rated assemblies with U-factor of 0.24 BTU/hr(ft²)°F or better.
7. FINISH HARDWARE PREPARATION: Prepare doors and frames to receive mortised and concealed finish hardware in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A156.115 series specifications for door and frame preparation for hardware.
 - a. REINFORCE DOORS AND FRAMES to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.
 - b. LOCATE FINISH HARDWARE as indicated on final shop drawings or, if not indicated, in accordance with "Recommended Locations for Builder's Hardware", published by Door and Hardware Institute.
8. SHOP PAINTING:
 - a. CLEAN, TREAT, AND PAINT exposed surfaces of steel door and frame units, including galvanized surfaces.
 - b. CLEAN STEEL SURFACES of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint.
 - c. APPLY SHOP COAT of prime paint of even consistency to provide a uniformly finished surface ready to receive finish paint.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling, and Unloading
 - 1. DELIVER hollow metal work cartoned or crated to provide protection during transit and job storage.
 - 2. INSPECT hollow metal work upon delivery and prior to installation for damage. Minor damages may be repaired provided finish items are equal in all respects to new work and acceptable to Architect-Engineer; otherwise, remove and replace damaged items as directed.
 - B. STORAGE AND PROTECTION - store doors and frames at building site under cover and in a manner that will prevent rust and damage. Place units on minimum 4" high wood blocking. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4" spaces between stacked doors to promote air circulation.
- 3.03 PREPARATION – NOT USED
- 3.04 CONSTRUCTION
- A. CONSTRUCTION / INSTALLATION
 - 1. GENERAL: Install standard steel doors, frames, and accessories in accordance with final shop drawings, manufacturer's data, and as herein specified.
 - 2. PLACING FRAMES: Comply with provisions of SDI-105 "Recommended Erection Instructions For Steel Frames", unless otherwise indicated.
 - a. EXCEPT FOR FRAMES located at in-place concrete or masonry and at drywall installations, place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.
 - 3. DOOR INSTALLATION:
 - a. FIT HOLLOW METAL DOORS accurately in frames, within clearances specified in SDI-100.
 - B. COORDINATION WITH OTHER WORK – NOT USED
- 3.05 FIELD QUALITY CONTROL – NOT USED
- 3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK
- A. PRIME COAT TOUCH-UP: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
 - B. FINAL ADJUSTMENTS: Check and readjust operating finish hardware items, leaving steel doors and frames undamaged, complete and in proper operating conditions.

PART 4 SCHEDULES – NOT USED

END OF SECTION

WOOD DOORS – FACTORY FINISH 08 14 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: This section includes Solid core flush wood doors with veneer faces. Doors are to be factory finished.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; latest edition.
- B. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; latest edition.
- C. UL 10B - Standard for Fire Tests of Door Assemblies; latest edition.
- D. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; latest edition.
- E. Quality Standards:
 - 1. ANSI / WDMA Doors (Window & Door Manufacturers Association) I.S. 1-A-13 Interior Architectural Wood Flush; latest edition.
 - 2. AWI North American Architectural Woodwork Standards; latest edition.
 - 3. ANSI A115.6 Preparation for Preassembled Locks (American National Standard Institute); latest edition.
 - 4. WI - Woodwork Institute (<https://woodworkinstitute.com/>) Woodwork Standards; latest edition.
- F. Labeling Agencies
 - 1. Intertek Testing Services-Warnock Hersey (ITS-WH); latest edition.
 - 2. Underwriters Laboratories, Inc. (UL); latest edition.

1.03 SUBMITTALS

- A. PRODUCT DATA - Submit door manufacturer's product data, specifications and installation instructions for each type of wood door.
 - 1. Include details of core and edge construction, trim for openings, louvers (if any), and similar components.
 - 2. Include certifications as may be required to show compliance with specifications.
- B. SHOP DRAWINGS - Submit door schedule indicating opening identification number, door types, grade, size, thickness, swing, label requirements, and undercuts when applicable. Use same identification numbers as Contract Drawings.
 - 1. Include door elevations indicating type of construction, stile and rail requirements, hardware blocking, reinforcing, stile finishing, provisions for vision panels, and other pertinent data.
 - 2. Indicate pre-fitting and pre-machining requirements, including hardware locations.
 - 3. Detail full size sections of vision panel moldings.
- C. SAMPLES - Submit samples for the following:
 - 1. TRANSPARENT FINISHED DOORS: Submit 12" x 12" veneer sheet from each available flitch to be used for face veneers. Also submit strips of solid wood 3" x 1'-0" of species to be used for exposed edges, trim and other solid wood components.

D. WARRANTY:

1. SPECIFIC PRODUCT WARRANTY: Submit written agreement on door manufacturer's standard form signed by Manufacturer, Installer and Contractor, agreeing to repair or replace defective doors which have warped (bow, cup or twist) or which show telegraphing of core construction in face veneers, or do not conform to tolerance limitations of NWMA and AWI.
 - a. The warranty shall also include refinishing and reinstallation which may be required due to repair or replacement of defective doors.
 - b. Warranty shall be in effect during following period of time after date of substantial completion.
 - i) SOLID CORE FLUSH INTERIOR DOORS: One year.

1.04 QUALITY ASSURANCE

A. QUALIFICATIONS

1. NWMA QUALITY MARKING: Mark each wood door with NWMA Wood Flush Door Certification Hallmark certifying compliance with applicable requirements of ANSI/NWMA I.S. 1 Series.
2. MANUFACTURER: Obtain doors from a single manufacturer to ensure uniformity in quality of appearance and construction, unless otherwise indicated.
3. REFERENCES: Comply with the applicable requirements of the following standards unless otherwise indicated:
 - a. ANSI/NWMA I.S. 1, "Industry Standard for Wood Flush Doors" published by National Woodwork Manufacturers Association (NWMA).

1.05 SYSTEM DESCRIPTION

A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

B. DESIGN / PERFORMANCE REQUIREMENTS – NOT USED

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS / EQUIPMENT

A. FACING MATERIALS:

1. Wood Face Veneer: AWI Quality Standard, AWI Grade A.
 - a. Species: Natural Birch.
 - b. Cut: Rotary sliced.
 - c. Book Match

B. WOOD FLUSH DOORS

1. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Masonite Architectural, [Interior & Exterior Architectural Doors | Masonite Architectural](#)
 - b. VT Industries, Eggers Stile & Rail Collection, [Architectural Wood Doors - VT Industries](#)
 - c. Vancouver Architectural Doors, www.vancouverdoorco.com
2. General: AWI Section 1300.
 - a. Door Thickness: 1-3/4 inch thick.
 - b. Top, Lock and Bottom Rails: Structural composite lumber (SCL). Minimum 1-1/8-inch-wide at top and bottom rail for typical doors. Minimum 5 inches wide at top and at bottom rails, complying with WDMA requirements for HB-1 blocking options, for doors equipped with closers or other applied hardware.

- c. Stiles: Solid, laminated, or veneered hardwood to match face veneer.
 - i) Screw Holding Capacity: 600-pound force, ASTM D1037.
 - ii) Modified Cleavage: 750-pound force, ASTM D143.
 - d. Crossband: 1/16-inch horizontal hardwood veneer or 1/16 to 1/11-inch high-density engineered fiberboard.
 - e. Bonding Adhesive:
 - i) Face Assembly: Type I for hot pressed assembly.
 - ii) Core Assembly: Type II.
 - f. Door Edges: Blind match door face. No joints.
3. Five-Ply Door: AWI PC-5 ME, premium grade.
- a. Construction: Face material and crossband bonded to each side of core.
 - b. Core: Structural composite lumber (SCL) or I-LD2 grade particleboard. Bond securely to crossbands with adhesive. Abrasive sand core to minimize telegraphing of core through veneer. Heat press assembly.
 - c. Process: Hot press only. Cold press not permitted.
 - d. Type: Wood Veneer Faced Solid Core Wood Door:
 - i) Veneer Thickness: 0.020 inch before sanding, for AWI Grade A veneer face for transparent finish.

2.02 FINISHES

A. Factory Finishing:

- 1. Factory finish doors in accordance with AWI/AWMAC/WI Architectural Woodwork Standards, Section 5.
- 2. Finish system: WDMA TR-8 UV Cured Acrylated Polyester Urethane.
 - a. Color: To be selected from manufacturer's full color range.
 - 1. Sheen: Semi-Gloss.
- 3. Field seal top and bottom edges, vision panel cutouts, [louver cutouts] and mortised hardware cutouts using manufacturer's standard sealer.
- 4. Finish edge stiles to match door face finish.
- 5. Metal Edges, Metal Vision Panel Frames, and Astragals: Manufacturer's standard oven cured low luster enamel.

2.03 ACCESSORIES

A. Metal Edge and Astragal: Cold rolled steel, 20 gauge minimum.

B. Fire Rated Stile: Manufacturer's standard multi-ply, reinforced, fire-rated stile. Match exposed edge to door face veneer and finish. Comply with WDMA premium grade requirements for blocking and reinforcement, including HB-4, HB-6, and HB-8 configurations.

- 1. Labeled and listed by UL or other testing agency acceptable to authorities having jurisdiction.

C. Vision Panel Molding:

- 1. Fire Rated Doors: Hardwood molding with mitered corners, equipped with metal clips or veneer on proprietary noncombustible material, species to match face veneer.
 - a. Molding and Accessories: Labeled and listed by UL or other testing agency acceptable to authorities having jurisdiction.

2.04 FABRICATION

A. Shop Assembly

- 1. General: AWI Section 01300. Factory pre-fit to size ready for installation; trimming at Project site not allowed. Factory machine for mortised hardware.

2. General: AWI Section 01300. Factory pre-fit fire rated assemblies sized and pre-machined for mortised hardware. Non-fire rated assemblies may be factory pre-fit and pre-machined, or as option, fit, and machined at Project site.
 - a. Prepare factory pre-fit and pre-machined assemblies in accordance with approved frame shop drawings, hardware schedule, and templates.
3. Fabricating Tolerances:
 - a. Pre-fit Size: Plus/minus 1/32-inch overall dimensions.
 - b. Squareness: Length of diagonal measured on face of door from upper right corner to lower left corner between length of diagonal measured on upper left corner to lower right corner with maximum difference of 1/8 inch.
 - c. Maximum Warp: 1/4 inch in any 42 by 84-inch plane of door face.
 - d. Show-through (Telegraphing): 0.010-inch deviation from true plane in any 3-inch span on door frame.
4. Edge Clearance:
 - a. Between Doors and Frames at Head and Jambs: 1/8 inch.
 - b. Between Meeting Stiles at Pairs of Doors: 1/8 inch.
 - c. Between Bottom Edge and Finished Floor: 1/2 inch, except where larger undercuts are scheduled at non-fire rated assemblies.
5. Stile Edge Treatment: Provide solid application of wood veneer at stile edge of doors to match face veneer.
 - a. Bevel strike stile of single doors and meeting stiles at pairs of doors 1/8 inch in 2 inches.
 - b. Bevel hinge stile of fire doors 1/16 inch in 2 inches.
6. Machining for Hardware: Factory machine for hardware requiring mortising and routing.
 - a. Machining not required for surface mounted hardware.
 - b. Prepare in accordance with applicable ANSI A115-W Series, except for hardware locations.
 - c. Prepare in accordance with templates and approved hardware schedule.
 - d. Pilot drill screw and bolt holes.
 - e. Locate hardware in accordance with requirements specified.
 - f. Doors Scheduled to Receive Electric Hardware: Provide with electric wire wireway inside door running from center hinge to electric hardware location; comply with fire rating label requirements for fire-rated doors.
7. Vision Panels: Factory cut openings.
 - a. For non-labeled doors, trim openings with hardwood moldings fixed one side, removable other side, and corners mitered.
 - b. For 20-minute fire rated doors, use fire rated system of concealed metal clips and hardwood molding.
 - c. For fire rated doors above 20-minute rating, frame openings with through-bolted metal framing.
 - d. Locate panels where indicated; 8 inches minimum required between edge of cutout and door edge.
 - e. Coordinate dimensions for glazing rabbets with requirements of specifications.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements
- B. Review of Existing Condition
 1. Verify substrate opening conditions.
 2. Verify that opening sizes and tolerances are acceptable and ready to receive this work.

3. Do not install doors in frame openings that are not plumb or are out of tolerance for size or alignment.

3.02 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling, and Unloading

1. Deliver, store, protect and handle products under provisions of WDMA, AWI and manufacturer's instructions.
2. Accept doors on site in manufacturer's standard packaging. Inspect for damage upon receipt.
3. Do not store in damp or wet areas or in areas where light might cause oxidization.
4. HVAC systems should be operating and balanced prior to arrival of doors. Acceptable humidity shall be no less than 25% nor greater than 55%.
5. Break seal on packages while at site to permit ventilation.

3.03 PREPARATION – NOT USED

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. Install doors in accordance with NFPA 80, manufacturers' instructions.
2. Trim door width by cutting equally on both jamb edges.
3. Trim door height by cutting bottom edges to a maximum 3/4 inch (19 mm).
4. Pilot drill screw and bolt holes using templates provided by hardware manufacturer. (Use threaded through bolts for half surface hinges).
5. Coordinate installation of doors with installation of frames and hardware
6. Install door louvers and light kits plumb and level.
7. Reseal or refinish any doors that required site alteration.

B. COORDINATION WITH OTHER WORK

1. Coordinate the work with door opening construction, door frame and door hardware installation with a pre-installation conference.

3.05 FIELD QUALITY CONTROL – NOT USED

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

A. Adjusting: After installation of hardware, adjust and check each door to ensure proper operation and function.

1. Replace or rehang doors which are hinge bound or which do not swing or operate freely.
2. Remove and replace doors which are warped in excess of WDMA and AWI standards for allowable warp in wood doors.
3. Refinish or replace field finished doors damaged during installation at Architect's discretion.

B. Cleaning: Comply with specifications. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish.

C. Protection: Protect finished work in accordance with specifications.

PART 4 SCHEDULES – NOT USED

END OF SECTION

ALUMINUM ENTRANCES AND STOREFRONTS 08 41 13

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: This section includes information regarding the aluminum entrances and storefronts required including exterior entrance doors and framing.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. American Society for Testing and Materials, ASTM:
 - 1. ASTM B221 / ASTM B221M Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; latest edition.
 - 2. ASTM B209 / ASTM B209M Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; latest edition.
 - 3. ASTM E283 Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; latest edition.
- B. American Architectural Manufacturers Association Publications (AAMA); latest edition.

1.03 SUBMITTALS

- A. PRODUCT DATA - Submit manufacturer's specifications, standard details, and installation recommendations for components of aluminum entrances and storefronts required for project, including test reports certifying that products have been tested and comply with performance requirements.
- B. SHOP DRAWINGS - Submit shop drawings for fabrication and installation of aluminum entrances and storefronts, including elevations, detail sections of typical composite members, hardware mounting heights, anchorages, reinforcement, expansion provisions, and glazing.
- C. SAMPLES – Submit three (3) 3"x3" color samples of the color selected by the Owner/ Architect.
- D. WARRANTY –
 - 1. CONTRACTOR'S WARRANTY: The Contractor shall warrant the aluminum entrances and storefront, workmanship and materials for a period 1 year after substantial completion. During the warranty period, he shall, at his own cost and expense, make or cause to be made such repairs or replacements as are necessary.
 - 2. MANUFACTURER'S WARRANTY: Submit executed copy of the manufacturer's standard warranty agreement signed by an authorized representative of the storefront manufacturer for a period of 1 year after the date of substantial completion.

1.04 QUALITY ASSURANCE:

- A. GENERAL: Plans, elevations and details show spacings of members, profile and similar dimensional requirements of aluminum entrances and storefront work. Minor deviations will be accepted in order to utilize manufacturer's standard products when, in Architect-Engineer's sole judgment, such deviations do not materially detract from design concept or intended performances.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.
- B. DESIGN / PERFORMANCE REQUIREMENTS
 - 1. GENERAL: Provide exterior entrance and storefront assemblies designed and fabricated to comply with requirements for system performance characteristics listed below.

2. THERMAL MOVEMENT: Allow for expansion and contraction resulting from ambient temperature range of 120°F (49°C).
 3. WIND LOADING: Provide capacity to withstand a uniform pressure of 20 PSF inward and 20 PSF outward as tested per ASTM E330.
 4. TRANSMISSION CHARACTERISTICS OF FIXED FRAMING.
 - a. AIR AND WATER LEAKAGES: Air infiltration of not more than 0.06 CFM per sq. ft. of fixed area per ASTM E283 and no uncontrolled water penetration per ASTM E331 at pressure differential of 6.24 psf (excluding operable door edges).
 - b. CONDENSATION RESISTANCE: Not less than 51 CRF per AAMA 1502.7.
 - c. THERMAL TRANSMITTANCE: U-value of not more than 0.65 Btu/(hr x sf x °F) per AAMA 1503.1.
 5. TRANSMISSION CHARACTERISTICS OF ENTRANCES.
 - a. AIR LEAKAGE: Air infiltration per linear foot of perimeter crack of not more than 0.50 CFM for single doors and 1.0 CFM for pairs of doors per ASTM E283 at pressure differential of 1.567 psf.
 - b. CONDENSATION RESISTANCE: Not less than 48 CRF per AAMA 1502.7.
 - c. THERMAL TRANSMITTANCE: U-value of not more than 0.93 Btu/(hr x sf x °F) per AAMA 1503.1.
- 1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS / EQUIPMENT

A. STOREFRONT FRAMING SYSTEM

1. Provide inside-outside matched resilient flush-glazed system with provisions for glass replacement. Shop-fabricate and pre-assemble frame components where possible.
 - a. THERMAL-BREAK CONSTRUCTION: Fabricate aluminum storefront framing system with integrally concealed, low conductance thermal barrier, located between exterior materials and exposed interior members. Provide manufacturer's standard construction which has been in use for similar projects for period of not less than 3 years.

B. STILE-AND-RAIL TYPE ALUMINUM DOORS

1. Provide tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or j-bolts, or fabricate with structurally welded joints, at manufacturer's option. Fabricate doors to facilitate replacement of glass or panels, without disassembly of door stiles and rails. Provide Snap-On extruded aluminum glazing stops, with exterior stops anchored for non-removal.
2. Provide doors 1-3/4" thick and of design indicated. Medium stile (3-1/2" nominal width).

C. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:

- | | | |
|------------------------------------|---------------|--|
| a. EFCO Corporation, | Monett, MO | www.efcocorp.com |
| b. Kawneer Co., Inc., | Norcross, GA | www.kawneer.com/ |
| c. Manko Window Systems | Manhattan, KS | www.mankowindows.com |
| d. Tubelite Architectural Aluminum | Walker, MI | www.tubeliteinc.com |
| e. YKK Architectural Products | Austell, GA | www.ykkap.com |

2.02 FINISHES

A. ANODIZED ALUMINUM FINISHES:

1. 50% flouropolymer paint meeting AAMA 2604 standards. Color to be selected from manufacturer's standard color options by Architect.
2. Source Quality: Provide Architectural aluminum wall system specified herein from a single source.
 - a. Building Enclosure System: When Architectural aluminum wall system are part of a building enclosure system, including entrances, entrance hardware, windows, storefront framing and related products, provide building enclosure system products from a single source manufacturer.

2.03 ACCESSORIES

- A. **HARDWARE:** Refer to hardware section of Division 8 for requirements for hardware items other than those indicated herein to be provided by manufacturer of aluminum entrances. Provide door manufacturer's standard heavy-duty hardware units as indicated, scheduled, or required for operation of each door, including the following items of sizes, number, and type recommended by manufacturer for service required, finished to match door, unless otherwise indicated.
1. **BALLBEARING BUTTS:** 5-knuckle, 2-bearings, steel/bronze sized to comply with ANSI A156.1, Grade 2 requirements; 2 butts for doors 7'-6" or less, 3 for taller doors. Exterior doors shall have non-removable pins (NRP).
 2. **OVERHEAD CLOSERS:** Units complying with ANSI A 156.4, of the following type, grade, functions and features.
 - a. **TYPE:** Overhead, exposed, modern type with cover.
 - i. Grade 1.
 - ii. Parallel arm mounting.
 - iii. With hold-open arm.
 - iv. Delayed action closing.
 3. **PANIC HARDWARE:** Complying with UL 305 and actuated by full-width heavy duty flat bar type. Provide only where required by door schedule; coordinate with access door control system.
 4. **FLUSHBOLTS:** Standard edge mortised type, for inactive leaves of pairs of doors.
 - a. Provide at both top and bottom of doors.
 5. **PUSH-PULL PLATES:** Standard aluminum units of style indicated, or as recommended by manufacturer if not indicated.
 - a. **PULL HANDLES:** Standard aluminum units of style indicated, or as recommended by manufacturer if not indicated.
 - b. **THRESHOLDS:** Extruded aluminum in mill finish, complete with anchors and clips, coordinated with pivots and floor-concealed closers, of size indicated or manufacturer's standard if not indicated.
- B. **FASTENERS:** Aluminum, nonmagnetic stainless steel, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum components.
1. **PROVIDE ANY EXPOSED FASTENERS** to match finish of members and hardware being fastened.
 2. **PROVIDE PHILLIPS flat-head machine screws** for exposed fasteners.
- C. **CONCEALED FLASHING:** Dead-soft stainless steel, 26 gage minimum, or extruded aluminum, 0.062" minimum, of an alloy and type selected by manufacturer for compatibility with other components.
- D. **BRACKETS AND REINFORCEMENTS:** Manufacturer's high-strength aluminum units where feasible; otherwise, nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A123 / A123M.

- E. CONCRETE/MASONRY INSERTS: Cast-iron, malleable iron, or hot-dip galvanized steel complying with ASTM A123 / A123M.
- F. BITUMINOUS COATINGS: Cold-applied asphalt mastic complying with SSPC-PS 12, compounded for 30-mil thickness per coat.
- G. COMPRESSION WEATHERSTRIPPING: Manufacturer's standard replaceable stripping of either molded neoprene gaskets complying with ASTM D2000 or molded PVC gaskets complying with ASTM D2287.
- H. SLIDING WEATHERSTRIPPING: Manufacturer's standard replaceable stripping of wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing, complying with AAMA 701.2.
- I. GLASS AND GLAZING MATERIALS: Provide glass and glazing materials which comply with requirements of "Glass and Glazing" section of these specifications.

2.04 FABRICATION

A. Shop Assembly

- 1. SIZES AND PROFILES: Required sizes for door and frame units, including profile requirements, are indicated on drawings.
- 2. PREFABRICATION: To greatest extent possible, complete fabrication, assembly, finishing, hardware application, and other work before shipment to project site. Disassemble components only as necessary for shipment and installation.
 - a. DO NOT DRILL and tap for surface-mounted hardware items until time of installation at project site.
 - b. PERFORM FABRICATION operations, including cutting, fitting, forming, drilling and grinding of metal work in manner which prevents damage to exposed finish surfaces. For hardware, perform these operations prior to application of finishes.
- 3. WELDING: Comply with AWS recommendations to avoid discoloration; grind exposed welds smooth and restore to natural finish.
- 4. REINFORCING: Install reinforcing as necessary for performance requirements; separate dissimilar metals with bituminous paint or other separator which will prevent corrosion.
- 5. CONTINUITY: Maintain accurate relation of planes and angles, with hairline fit of contacting members.
- 6. FASTENERS: Conceal fasteners wherever possible.
- 7. WEATHERSTRIPPING: For exterior doors, provide compression weather-stripping against fixed stops; at other edges, provide sliding weather-stripping retained in adjustable strip mortised into door edge.
 - a. PROVIDE EPDM/vinyl blade gasket weather-stripping in bottom door rail, adjustable for contact with threshold.
 - b. AT INTERIOR DOORS and other locations without weather stripping, provide neoprene silencers on tops to prevent metal-to-metal contact.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle framing material and components to avoid damage. Protect framing material against damage from elements, construction activities, and other hazards before, during and after framing installation.

3.03 JOB CONDITIONS:

1. FIELD MEASUREMENT: Wherever possible, take field measurements prior to preparation of shop drawings and fabrication, to ensure proper fitting of work. However, proceed with fabrication and coordinate installation tolerances as necessary when field measurements might delay work.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. COMPLY WITH MANUFACTURER'S INSTRUCTIONS and recommendations for installation of aluminum entrances and storefronts.
2. SET UNITS PLUMB, level, and true to line, without warp or rack of framing members, doors, or panels. Anchor securely in place, separating aluminum and other corrodible metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials.
3. DRILL AND TAP frames and doors and apply surface-mounted hardware items, complying with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.
4. SET SILL MEMBERS and other members in bed of sealant as indicated, or with joint fillers or gaskets as indicated to provide weathertight construction. Comply with requirements of Division 7 for sealants, fillers, and gaskets.
5. REFER TO "GLASS AND GLAZING" Section of Division 8 for installation of glass and other panels shown to be glazed into doors and framing, and not pre-glazed by manufacturer.

B. COORDINATION WITH OTHER WORK – NOT USED

3.05 FIELD QUALITY CONTROL – NOT USED

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. ADJUST OPERATING HARDWARE to function properly, without binding, and to provide tight fit at contact points and weather-stripping.
- B. CLEAN COMPLETED SYSTEM, inside and out, promptly after erection and installation of glass and sealants. Remove excess sealants, dirt, and other substances from aluminum surfaces.

PART 4 SCHEDULES – NOT USED

END OF SECTION

FINISH HARDWARE 08 71 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: "Finish Hardware" includes items known commercially as finish hardware which are required for swing doors, except special types of unique and non-matching hardware specified in the same section as the door and door frame.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES–

- A. American National Standards Institute – ANSI 156.18 – Materials and Finishes.
- B. BHMA – Builders Hardware Manufacturers Association
- C. DHI – Door and Hardware Institute
- D. NFPA – National Fire Protection Association
- E. UL – Underwriters Laboratories
- F. UL 305 – Standard for Panic Hardware

1.03 SUBMITTALS

- A. PRODUCT DATA: Submit manufacturer's technical product data for each item of hardware in accordance with Division-1 section "Submittals". Include information necessary to show compliance with requirements and include instructions for installation and for maintenance of operating parts and finish.
- B. SHOP DRAWINGS
 - 1. HARDWARE SCHEDULE: Submit final hardware schedule for review in manner indicated below. Coordinate hardware with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of hardware.
 - a. FINAL HARDWARE SCHEDULE CONTENT: Based on finish hardware indicated, organize hardware schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
 - i. Type, style, function, size and finish of each hardware item.
 - ii. Name and manufacturer of each item.
 - iii. Fastenings and other pertinent information.
 - iv. Location of hardware set cross-referenced to indications on Drawings both on floor plans and in frame and door schedule.
 - v. Explanation of all abbreviations, symbols, codes, etc. contained in schedule.
 - vi. Mounting locations for hardware.
 - vii. Door and frame sizes and materials.
 - viii. Keying information.
 - 2. TEMPLATES: Furnish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware. Upon request, check shop drawings of such other work, to confirm that adequate provisions are made for proper location and installation of hardware.
- C. WARRANTY – Manufacturer's standard warranty for each product provided.
- D. CLOSE OUT DOCUMENTS - Refer to Section 01 77 00 for the General requirements for Contract Close-out.
- E. DESIGN DATA/ REGULATORY REQUIREMENTS

1.04 QUALITY ASSURANCE

A. QUALIFICATIONS

1. MANUFACTURER: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer. Manufacturers offering equivalent products may be considered subject to the minimum criteria established and approval of the Architect.
2. SUPPLIER: A recognized architectural finish hardware supplier, with warehousing facilities, who has been furnishing hardware for a period of not less than 5 years, and who is, or who employs an experienced architectural hardware consultant who is available, at reasonable times while the work, for consultation about project's hardware requirements, to Owner, Architect-Engineer and Contractor

1.05 SYSTEM DESCRIPTION

A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

B. DESIGN/ PERFORMANCE REQUIREMENTS

1. TYPES of finish hardware required include the following:
 - a. Hinges
 - b. Lock cylinders and keys
 - c. Lock and latch sets
 - d. Bolts
 - e. Exit devices
 - f. Push/pull units
 - g. Closers
 - h. Miscellaneous door control devices
 - i. Door trim units
 - j. Weather stripping for exterior doors.
 - k. Thresholds for exterior doors
 - l. Rain diverters (drip)
2. HAND OF DOOR: Drawings show direction of slide, swing, or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.
3. MANUFACTURER'S NAME PLATE: Do not use manufacturer's products which have manufacturer's name or trade name displayed in a visible location (omit removable nameplates), except in conjunction with required UL labels and as otherwise acceptable to Architect-Engineer.
 - a. Manufacturer's identification will be permitted on rim of lock cylinders only.
4. BASE METALS: Produce hardware units of basic metal and forming using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser quality than specified for the applicable hardware units by applicable ANSI A156 series standard for each type of hardware item and with ANSI A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.
5. FASTENERS: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
6. FURNISH SCREWS for installation, with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.

7. PROVIDE CONCEALED FASTENERS for hardware units which are exposed when door is closed, except to the extent no standard units of the type specified are available with concealed fasteners. Do not use through-bolts for installation where bolt head or nut on opposite face is exposed in other work, except where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each through-bolt or use sex bolts and mating screws.
- 1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.
- A. MAINTENANCE: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of finish hardware.
 - B. EXTRA MATERIALS:
 1. Provide additional stops; 10 percent over the quantity required for each type.

PART 2 PRODUCTS

2.01 MATERIALS / EQUIPMENT

- A. LOCKS, LATCHES AND BOLTS:
 1. Extra Heavy-Duty Cylindrical Locks and Latches: as scheduled.
 - a. Chassis: cylindrical design, corrosion-resistant plated cold-rolled steel, through-bolted.
 - b. Locking Spindle: stainless steel, interlocking design.
 - c. Latch Retractors: forged steel. Balance of inner parts: corrosion-resistant plated steel, or stainless steel.
 - d. Lever Trim: accessible design, independent operation, spring-cage supported, minimum 2" clearance from lever mid-point to door face.
 - e. Electric operation: Manufacturer-installed continuous duty solenoid.
 - f. Strikes: 16 gage curved steel, bronze, or brass with 1" deep box construction, lips of sufficient length to clear trim and protect clothing.
 - g. PROVIDE STANDARD (OPEN) STRIKE plates for interior doors and dustproof strikes plates for exterior.
 - h. Lock Series and Design: Schlage D series, "Sparta" design.
 - i. Certifications:
 - i. ANSI A156.2, 2017, Series 4000, Grade 1.
 - ii. UL listed for A label and lesser class single doors up to 4ft x 8ft.
 2. LOCK THROW: Provide 9/16" minimum throw of latch and deadbolt used on pairs of doors. Comply with UL requirements for throw bolts and latch bolts on rated fire openings.
 - a. Provide 1/2" minimum throw on other latch and deadlock bolts.
 3. FLUSH BOLT HEADS: Minimum of 1/2" diameter rods of brass, bronze, or stainless steel, with minimum 12" long rod for doors up to 7' 0" in height.
- B. LOCK CYLINDERS AND KEYING:
 1. GENERAL: See requirements above regarding establishing a coordination meeting.
 2. CONSTRUCTION KEYING system shall be utilized. Construction cores shall be removed, and permanent cores installed. Construction cores shall be returned to the manufacturer at the end of the construction period.
 3. KEYING REQUIREMENTS:
 - a. Key Systems: Schlage Everest patented keyway, interchangeable core. Key blanks are available only from factory-direct sources, not available from after-market key blank manufacturers. For estimate use factory GMK charge. Initiate and conduct meeting(s)

with Owner to determine system keyway(s) and structure, furnish Owner's written approval of the system.

- i. New factory registered master key system.
- ii. Construction keying: brass keyed-alike temporary cores plus 10 operating keys and 2 construction control keys. Temporary cores and keys remain the property of hardware supplier.
- b. Interchangeable Cores: utility patented, 6-pin solid brass construction.
- c. Locksets and cylinders: keyed at factory of lock manufacturer where permanent records are maintained. Locks and cylinders are the same manufacturer.
- d. Permanent keys and cores: secured shipment direct from point of origination to Owner's representative.
- e. Biting List: Secured shipment direct from point of origination to Owner upon completion.

2.02 ACCESSORIES

A. HINGES, BUTTS, AND PIVOTS:

1. MORTISE HINGES: 4-1/2-inch X 4-1/2-inch except where noted otherwise. Five knuckle type with concealed bearings and heavy duty 0.180-inch-thick leaves.
2. EXTERIOR HINGES shall be non-ferrous base metal with stainless steel pins. (See below for special requirements)
3. TEMPLATES: Provide only template-produced units.
4. SCREWS: Furnish Phillips flat-head or machine screws for installation of units, except furnish Phillips flat-head or wood screws for installation of units into wood. Finish screw heads to match surface of hinges or pivots.
5. HINGE PINS: Except as otherwise indicated, provide hinge pins as follows:
 - a. STEEL HINGES: Steel pins.
 - b. NONFERROUS HINGES: Stainless steel pins.
 - c. EXTERIOR DOORS: Non-removable pins. (NRP)
 - d. OTHER INTERIOR DOORS: Non-rising pins.
 - e. TIPS: Flat button and matching plug, finished to match leaves.
 - f. NUMBER OF HINGES: Provide number of hinges indicated but not less than 3 hinges for door leaf for doors 90" or less in height and one additional hinge for each 30" of additional height.

B. PUSH/PULL UNITS:

1. EXPOSED FASTENERS: Provide manufacturer's standard exposed fasteners for installation; through-bolted for matched pairs, but not for single units.
2. PULL PLATES: 4-inch X 16-inch X .050-inch with bar type pull size 3/4-inch diameter with minimum 7-inch center to center mounting holes and with minimum clearance for barrier free entry. Furnish pull with 1/4-20 through bolts and plate with all thread sheet metal screws.
3. PUSH PLATES: 4-inch X 16-inch X .050-inch fastened with all thread sheet metal screws.
4. ARMOR AND KICK PLATES: 8-inch-high X width of door X .050-inch fastened with sheet metal screws plated to match the protection.

C. CLOSERS AND DOOR CONTROL DEVICES:

1. SIZE OF UNITS: Except as otherwise specifically indicated, comply with the General: One manufacturer for closer units throughout the Work, including surface closers.
2. Surface Closers:
 - a. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast-iron body.

- Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
 - b. ISO 2000 certified. Units stamped with date-of-manufacture code.
 - c. Independent lab-tested 8,000,000 cycles.
 - d. Thru-bolts at wood doors unless doors are provided with closer blocking. Non-sized, non-handed, and adjustable. Place closer inside building, stairs, and rooms.
 - e. Plates, brackets, and special templating when needed for interface with header, door and wall conditions and neighboring hardware.
 - f. Opening pressure: Exterior doors 8.5 lb., interior doors 5 lb., labeled fire doors 15 lb.
 - g. Separate adjusting valves for closing speed, latching speed, and back check, fourth valve for delayed action where scheduled.
 - h. Extra-duty arms (EDA) at exterior doors scheduled with parallel arm units.
 - i. Exterior door closers: tested to 100 hours of ASTM B117 salt spray test, furnish data on request.
 - j. Exterior doors do not require seasonal adjustments in temperatures from 120 degrees F to -30 degrees F, furnish data on request.
 - k. Non-flaming fluid will not fuel door or floor covering fires.
3. PROVIDE ALTERNATE MOUNT on parallel arm closers to provide 180 degree opening and holding range between 110 and 180 degrees.
- D. DOOR TRIM UNITS:
- 1. FASTENERS: Provide manufacturer's standard exposed fasteners for door trim units (edge trim); either machine screws or self-tapping screw.
- E. WEATHERSTRIPPING:
- 1. GENERAL: Except as otherwise indicated, provide continuous weather stripping at each edge of every exterior door leaf. Provide type, sizes and profiles shown or scheduled. Provide non-corrosive fasteners as recommended by manufacturer for application indicated.
 - 2. REPLACEABLE SEAL STRIPS: Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.
 - 3. WEATHERSTRIPPING AT JAMBS AND HEADS: Provide bumper-type resilient insert and metal retainer strips, surface-applied unless shown as mortised or semi-mortised, of following metal, finish and resilient bumper material:
 - a. Extruded aluminum with clear anodized finish with 0.062" minimum thickness of main walls and flanges.
 - 4. WEATHERSTRIPPING AT DOOR BOTTOMS: Provide threshold consisting of contact type resilient insert and metal housing of design and size shown; of following metal, finish, and resilient seal strip:
 - a. Extruded aluminum with natural anodized finish; 0.062" minimum thickness of main walls and flanges.
 - 5. EXTERIOR doors shall be provided with rain cap on the door frame to prevent water migration into the door. Sweeps shall be provided on the outside face at the bottom of the doors and formed to provide protection from water infiltration.
 - 6. AIR LEAKAGE of exterior doors shall not exceed .5 cubic feet per minute of air per square foot of door area when tested in accordance with ASTM E283.
- F. THRESHOLDS: Except as otherwise indicated provide standard metal threshold unit of type, size and profile as shown or scheduled. All entry and egress doors shall be accessible to the physically handicapped.
- G. STOPS:
- 1. WALL STOPS: Where possible, use wall mounted doorstops fastened with a toggler.

- a. Diameter of the wall stop shall be approximately 2-5/8 inch with concave rubber bumper projecting 3/4 inch and positioned to match the location where the hardware collides with the wall. Ensure alignment so that lock buttons are not actuated when lockset engages the stop.
- 2. FLOOR STOPS: Where wall stops are NOT appropriate provide heavy duty, floor stops with 70 durometer, fire resistant bumper capable of withstanding 300-pound impact.
 - a. Projection from the floor shall be great enough for the door to strike approximately 1/2 inch minimum from the top of the stop.
 - b. Stop shall be embedded in the floor and set in epoxy grout.

H. MANUFACTURERS:

- 1. Listed specified and acceptable alternate manufactures. All substitutions are subject to compliance with minimum design criteria and approval of the Architect.

ITEM:	MANUFACTURER:	ACCEPTABLE SUB:
Auto Flush Bolts	(IVE) Ives	DCI, HageR
Closers	(LCN) LCN	Norton, Stanley, Yale
Continuous Hinges	(HAG) Hager	Markar, Pemko
Coordinators	(IVE) Ives	DCI, Hager
Electric Strike	(ASA) Assa Abloy	
Exit Devices	(VON) Von Duprin	Precision, Yale
Hinges	(IVE) Ives	Bommer, Hager, Stanley
Key Cabinets	(TEL) Telkee	Lund
Key System	(SCH) Schlage	Best, Yale
Kickplates	(IVE) Ives	Hager, Rockwood
Locks	(SCH) Schlage	Best, Corbin, Sargent, Yale
Metal Access Ramps	(NGP) National Guard	Reese, Zero
Overhead Stops	(GLY) Glynn-Johnson	Rixson
Push & Pull Plates	(IVE) Ives	Hager, Rockwood
Seals & Bottoms	(NGP) National Guard	Reese, Zero
Signs	(IVE) Ives	Hager, Rockwood
Silencers	(IVE) Ives	DCI, Hager
Stops & Holders - exterior	(IVE) Ives	Hager, Rockwood
Stops & Holders – interior	(IVE) Ives	Hager, Rockwood
Thresholds	(NGP) National Guard	Reese, Zero

2.03 FINISHES

- A. PROVIDE MATCHING FINISHES for hardware units at each door or opening, to the greatest extent possible, and except as otherwise indicated. Reduce differences in color and textures as much as possible where the base metal or metal forming process is different for individual units of hardware exposed at the same door or opening. In general, match items to the manufacturer's standard finish for the latch and lock set (or push-pull units if no latch-lock sets) for color and texture.
- B. PROVIDE FINISHES WHICH MATCH those established by BHMA:
 - 1. All finishes shall be as indicated in schedules.
- C. PROVIDE QUALITY OF FINISH, including thickness of plating or coating (if any), composition, hardness and other qualities complying with manufacturer's standards.
- D. THE DESIGNATIONS USED IN SCHEDULES and elsewhere to indicate hardware finishes are the industry-recognized standard commercial finishes, except as otherwise noted.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. Refer to division 1 for General Requirements
- 3.02 DELIVERY, STORAGE AND HANDLING
 - A. Shipping and Handling
 - 1. TAG EACH ITEM OR PACKAGE separately, with identification related to final hardware schedule, and included basic installation instructions with each item or package.
- 3.03 PREPARATION
 - A. JOB CONDITIONS
 - 1. Ensure that walls and frames are square and plumb before hardware installation.
 - 2. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.
 - a. Notify Architect of any code conflicts before ordering material.
 - b. Where new hardware is to be installed near existing doors/hardware scheduled to remain, match locations of existing hardware.
 - 3. Metal doors/frames: Weld or fasten with screws: filler pieces in existing hardware cut-outs and mortises not scheduled for re-use by new hardware. Leave surfaces smooth - no applied patches.
- 3.04 CONSTRUCTION
 - A. CONSTRUCTION / INSTALLATION
 - 1. MOUNT HARDWARE UNITS at heights indicated in "Recommended Locations for Builders Hardware for Custom Steel Doors and Frames" by the Door and Hardware Institute, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect-Engineer.
 - 2. INSTALL EACH HARDWARE ITEM in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of surface protections with finishing work specified in the Division-9 sections. Do not install surface-mounted items until finishes have been completed on the substrate.
 - 3. SET UNITS LEVEL, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
 - 4. DRILL AND COUNTERSINK units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
 - 5. SET THRESHOLDS for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant.
 - B. Coordination with Other Work
 - 1. Coordination shall be set by the Contractor with the Construction Manager / Architect, hardware supplier and Owner's representative prior to the preparation of submittals to coordinate all general locking functions, keying, and general hardware installation.
- 3.05 FIELD QUALITY CONTROL – NOT USED
- 3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK
 - A. ADJUST
 - 1. Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.
 - a. Hardware damaged by improper installation or adjustment methods to be repaired or replaced to Owner's satisfaction.

2. Inspection: Use hardware supplier. Include suppliers with closeout documents.
 3. Follow-up inspection: Installer to provide letter of agreement to Owner that approximately 6 months after substantial completion, installer will visit Project with representatives of the manufacturers of the locking devices and door closers to accomplish following:
 - a. Re-adjust hardware.
 - b. Evaluate maintenance procedures and recommend changes or additions and instruct Owner's personnel.
 - c. Identify items that have deteriorated or failed.
 - d. Submit written report identifying problems and likely future problems.
 - e. FINAL ADJUSTMENT: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- B. CLEAN ADJACENT SURFACES soiled by hardware installation.
- C. INSTRUCT OWNER'S PERSONNEL in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.

PART 4 SCHEDULES

- 4.01 REQUIREMENTS for design, grade, function, finish, size and other distinctive qualities of each type of finish hardware are indicated in the Hardware Schedule at the end of this section.
- A. MANUFACTURER'S PRODUCT DESIGNATIONS: At least one manufacturer is listed for each hardware type required to establish minimum criteria. Manufacturers of equivalent products and functions may be substituted subject to meeting these criteria and approval of the Architect.

4.02 HARDWARE SETS: Not all hardware sets may be used, see Door Schedule.

- A. All doors are to receive the following, on each door leaf, unless noted otherwise.

3	EA	HINGE	5BB1-NRP 4.5 X 4.5	652	IVE
1	EA	WALL STOP	WS402CCV	626	IVE

- B. See door schedule for the following, on each door leaf.

1	EA	SURFACE CLOSER	ND10S SPA	626	SCH
1	EA	KICK PLATE	8400 10" X 34"	630	IVE
1	SET	SEALS	S88D 17'	DKB	PEM
1	SET	WEATHERSTRIP	110S	110S	AL

SET H1: Exterior aluminum entrance doors

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	PERMANENT CORE	23-030	626	SCH

HARDWARE NOT SCHEDULED TO BE PROVIDED BY THE ALUMINUM DOOR MANUFACTURER.

SET H2: Passage – Non-Locking

1	EA	PASSAGE SET	ND10S SPA	626	SCH
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SET H3: Office with Push Button/Key Lock

1	EA	ENTRANCE LOCK	ND53RD SPA	626	SCH
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SET H4: Single Person Restroom – Push Button Lock

1	EA	PRIVACY W/ INDICATOR	ND85PD SPA	626	SCH
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SET H5: Exterior Storage

1	EA	STOREROOM LOCK	ND80RD SPA	626	SCH
1	EA	DOOR SWEEP	345AV 36"	AL	PEM
1	EA	DOOR SWEEP	346C 40"	AL	PEM
1	EA	THRESHOLD	171A 36"	AL	PEM
1	EA	DRIP CAP	16A 40"	AL	NGP

SET H6: Multi-Person Restroom

1	EA	PUSH PLATE	8200 8" X 16"	630	IVE
1	EA	PULL PLATE	8303-0 4" X 16"	630	IVE

SET H7: Exterior

1	EA	PANIC HARDWARE	98E0/98EO-F	626	VON
1	EA	RIM CYLINDER	20-057	626	SCH
1	EA	DOOR SWEEP	345AV 36"	AL	PEM
1	EA	DOOR SWEEP	346C 40"	AL	PEM
1	EA	THRESHOLD	171A 36"	AL	PEM
1	EA	DRIP CAP	16A 40"	AL	NGP

SET H8: Public Area Locked after Hours

1	EA	CLASSROOM LOCK	ND70R SPA	626	SCH
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SET H9: Evidence

1	EA	STOREROOM LOCK	ND80RD SPA	626	SCH
1	EA	DEADBOLT	B500	626	SCH

SET H10: Key Lock – Both Sides

1	EA	INSTITUTIONAL SET	ND82PD SPA	626	SCH
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ATTIC STOCK ITEMS

Qty	Description	Catalog Number	Fin	Mfgr
6	HINGE	5BB1-NRP 4.5 X 4.5	652	IVE
1	ENTRANCE LOCK	ND53RD SPA 13-047 10-025	626	SCH
1	CLASSROOM LOCK	ND70RD SPA 13-047 10-025	626	SCH
2	STOREROOM LOCK	ND80RD SPA 13-047 10-025	626	SCH
10	CORE ONLY	23-030	626	SCH
1	PRIVACY SET	ND40S SPA 13-048 10-025	626	SCH
2	SURFACE CLOSER	4041	689	LCN
1	KEY CONTROL SFTWR	SITEMASTER KEY CONTROL SOFTWARE		SCH
4	TRAINING	2 HOUR TRAINING MODULE BY MANUFACTURER		
100	KEY BLANKS	35-002		SCH
5	KEY BLANKS	35-003		SCH
2	CONTROL KEYS	49-003		SCH

END OF SECTION

GLASS AND GLAZING 08 80 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: "Glass" includes both primary and fabricated glass products as described in FGMA "Glazing Manual". "Glazing" includes glass installation and materials used to install glass. This section includes glass and glazing for the following: Window unit glazing, Tinted Entry glazing, Interior non-security glazing, and Tinted Insulated glass in exterior frames.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

REFERENCES

- A. ASTM
- B. UL – Underwriters Laboratories

1.02 SUBMITTALS

- A. PRODUCT DATA: Submit manufacturer's technical data for each glazing material and fabricated glass product required, including installation and maintenance instructions.
- B. SHOP DRAWINGS – NOT USED
- C. SAMPLES: Submit, for verification purposes, 12" square samples of each type of glass indicated except for clear single pane units, and 12" long samples of each color required (except black) for each type of sealant or gasket exposed to view. Install sealant or gasket sample between two strips of material representative of adjoining framing system in color.
- D. WARRANTY
 - 1. MANUFACTURER'S WARRANTY ON COATED GLASS PRODUCTS: Provide written warranty signed by manufacturer of coated glass agreeing to furnish f.o.b. point of manufacture, freight allowed project site, within specified warranty period indicated below, coated glass units which develop manufacturing defects. Manufacturing defects are defined as peeling, cracking or deterioration in metallic coating due to normal conditions and not due to handling or installation or cleaning practices contrary to glass manufacturer's published instructions.
 - a. WARRANTY PERIOD: Manufacturer's standard but not less than 5 years after date of substantial completion.
 - 2. MANUFACTURER'S WARRANTY ON INSULATING GLASS: Provide written warranty signed by manufacturer of laminated glass agreeing to furnish f.o.b. point of manufacture, freight allowed project site, within specified warranty period indicated below, insulating glass units which develop manufacturing defects. Manufacturing defects are defined as failure of hermetic seal of air space (beyond that due to glass breakage) as evidenced by intrusion of dirt or moisture, internal condensation or fogging at temperature above -20°F (-29°C), deterioration of protected internal glass coatings, if any, and other visual indications of seal failure or performance; provided the manufacturer's instructions for handling, installing, protecting and maintaining units have been complied with during the warranty period.
 - a. WARRANTY PERIOD: Manufacturer's standard but not less than 10 years after date of substantial completion.

1.03 QUALITY ASSURANCE

- A. QUALIFICATIONS

1. GLAZING STANDARDS: Comply with recommendations of Flat Glass Marketing Association (FGMA) "Glazing Manual" and "Sealant Manual" except where more stringent requirements of glass and glazing terms not otherwise defined in this section or other referenced standards.
2. SAFETY GLAZING STANDARD: Where safety glass is indicated or required by authorities having jurisdiction, provide type of products indicated which comply with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for category II materials.
3. FIRE-RESISTANCE-RATED WIRE GLASS: Provide wire glass products that are identical to those tested per ASTM E163 (UL 9) and are labeled and listed by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.
4. SINGLE SOURCE RESPONSIBILITY: Provide materials obtained from one source for each type of glass and glazing product indicated.

B. CERTIFICATIONS

1. INSULATING GLASS CERTIFICATION PROGRAM: Subject to compliance with requirements, provide insulating glass units permanently marked either on spacers or on at least one component pane of units with appropriate certification label of inspecting and testing organization indicated below.
 - a. Insulating Glass Certification Council (IGCC).

1.04 SYSTEM DESCRIPTION

A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

B. DESIGN / PERFORMANCE REQUIREMENTS

1. Provide insulating glass and glazing that has been produced, fabricated and installed to withstand normal temperature changes, wind loading, impact loading (where applicable), without failure including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of insulating glass and glazing materials, and other defects in the work. Deterioration of insulating glass is defined as failure of hermetic seal due to other causes than breakage which results in intrusion of dirt or moisture, internal condensation or fogging at temperatures above -20°F (-28°C), deterioration of protected internal glass coating, if any, resulting from seal failure, and other visual evidence of seal failure or performance.

C. DESIGN DATA

1. PRIMARY GLASS STANDARD: Provide primary glass which complies with ASTM C1036 requirements, including those indicated by reference to type, class, quality and form.
2. HEAT-TREATED GLASS STANDARD: Provide heat-treated glass which complies with ASTM C1048 requirements, including those indicated by reference to grade, style, type, quality, and class.
3. INSULATING GLASS STANDARD: Provide pre-assembled sealed insulating glass units which comply with ASTM 04.11 requirements for classification designated below:

1.05 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

A. PRIMARY GLASS PRODUCTS

1. CLEAR FLOAT GLASS: Type I, class 1 (transparent), quality q3 (glazing select), 1/4" thick if not otherwise indicated.

2. CLEAR TEMPERED FLAT GLASS: Grade B (fully tempered), style I (uncoated surfaces), type I (float), quality q3 (glazing quality), class 1 (transparent).
 3. TINTED GLASS: 1" thick insulated glass, SolarCool + Low -E by Vitro Architectural Glass or equal. Provide manufacturer's sample box of ALL colors for Owner / Architect's selection.
 4. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. MANUFACTURERS OF CLEAR AND TINTED FLOAT GLASS:
 - i. Guardian Industries Corp., <https://www.guardianglass.com/us/en>
 - ii. Pilkington, <https://www.pilkington.com/en/us>
 - iii. Vitro Architectural Glass, <https://www.vitroglazings.com/#>
 - iv. Viracon, <https://www.viracon.com/>
 - b. MANUFACTURER'S OF INSULATING GLASS:
 - i. Guardian Industries Corp., <https://www.guardianglass.com/us/en>
 - ii. Pilkington, <https://www.pilkington.com/en/us>
 - iii. Vitro Architectural Glass, <https://www.vitroglazings.com/#>
 - iv. Viracon, <https://www.viracon.com/>
- B. SAFETY WIRE GLASS: Type II (rolled), class 1 (translucent), quality q8 (glazing); complying with ANSI Z97.1, Class A; 1/4" thick; of form and mesh pattern indicated below:
1. POLISHED WIRE GLASS: Form 1 (wired, polished both sides), mesh m2 (square).
 2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - i. National Guard Products, Protect3, <https://www.ngp.com/>
 - ii. Safti First, SuperLite I-W, <https://safti.com/>
 - iii. TGP Wirelite NT, <https://www.fireglass.com/>
- 2.02 FINISHES – NOT USED
- 2.03 ACCESSORIES: Provide materials with proven record of compatibility with surfaces contacted in installation.
- A. GLAZING SEALANTS
1. GENERAL: Comply with recommendations of sealant and glass manufacturers for selection of glazing sealants which have performance requirements suitable for applications indicated and conditions at time of installation.
 - a. COMPATIBILITY: Select sealants with proven compatibility with surfaces contacted in the installation and under service conditions indicated, as demonstrated by testing and field experience.
 - b. COLORS: Provide color of exposed sealants indicated or, if not otherwise indicated, as selected by Architect-Engineer from manufacturer's standard colors.
 2. SILICONE GLAZING SEALANT: Single component elastomeric silicone sealant complying with FS TT-S-1543, Class A, nonsag; and with ASTM C920, Type S, Grade NS, Class 25, Use G and, as applicable to use indicated, Uses A and O:
 - a. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - i. LOW-MODULUS SILICONE GLAZING SEALANTS:
 - (A) Dow Corning 790; Dow Corning, <https://www.dow.com/en-us.html>
 - (B) Silglaze N; G.E., <https://www.ge.com/>
 - (C) UltraPruf II SCS 2900; G.E., <https://www.ge.com/>
 - (D) 864NST, Pecora, <https://www.pecora.com/>
 - (E) Spectrem 1; Tremco, <https://www.tremcosealants.com/>

- ii. HIGH-MODULUS SILICONE GLAZING SEALANTS:
 - (A) 795; Dow Corning, <https://www.dow.com/en-us.html>
 - (B) SCS 2000 SilPruf; G.E., <https://www.ge.com/>
 - (C) 895NST; Pecora Corp., <https://www.pecora.com/>
 - (D) Spectrem 2; Tremco, <https://www.tremcosealants.com/>
 3. 2-PART POLYSULFIDE GLAZING SEALANT: Polysulfide elastomeric sealant complying with FS TT-S-227, Class A, Type 2; and with ASTM C920, Type M, Grade NS, Class 25, Use G and, as applicable to use indicated, Uses A and O.
 - a. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - i. Duoflex NS; Sika, <https://usa.sika.com/>
 - ii. GC2+ Synthacaulk; Pecora, <https://www.pecora.com/>
 - iii. N400; CR Laurence, <http://www.crlaurence.com/>
 4. PERFORMED BUTYL-POLYISOBUTYLENE GLAZING TAPE: Blend of butyl-polyisobutylene rubber with a solids content of 100%, in extruded tape form, complying with AAMA 807.1, packaged on rolls with a release paper on side, with or without continuous spacer rod as recommended by manufacturers of tapes and glass for application indicated.
 - a. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - i. PTI 606; Polyguard Products, Inc., <https://www.polyguardproducts.com/>
 - ii. Venture Tape; 3M, <https://www.3m.com/>
 - iii. POLYshim II Tape; Tremco, <https://www.tremcosealants.com/>
 - iv. Tremco 440 Tape; Tremco, <https://www.tremcosealants.com/>
 - v. SGT-900 Tape; Tremco, <https://www.tremcosealants.com/>
- B. GLAZING GASKETS:
 1. LOCK-STRIP GASKETS: Neoprene extrusions of size and shape indicated, fabricated into frames with molded corner units and zipper lock strips, complying with ASTM C542; black.
 - a. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - i. Griffith Rubber Mills; <https://www.griffithrubber.com/>
 - ii. Norton Gaskets; <http://www.nortongaskets.com/index.html>
 - iii. The Standard Products Co.; <https://www.srpco.com/>
 2. CELLULAR ELASTOMERIC PREFORMED GASKETS: Extruded or molded closed cell, integral-skilled neoprene of profile and hardness required to maintain watertight seal; complying with ASTM C509, Type II; black.
 - a. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - i. Griffith Rubber Mills; <https://www.griffithrubber.com/>
 - ii. Tremco, <https://www.tremcosealants.com/>
- C. CLEANERS, PRIMERS AND SEALERS: Type recommended by sealant or gasket manufacturer Input description
- D. SETTING BLOCKS: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealants, 80 to 90 Shore A durometer hardness.
- E. SPACERS: Neoprene, EPDM or silicone blocks, or continuous extrusions, as required for compatibility with glazing sealant, of size, shape and hardness recommended by glass and sealant manufacturers for application indicated.

- F. EDGE BLOCKS: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealant, of size and hardness required to limit lateral movement (side-walking) of glass.
 - G. COMPRESSIBLE FILLER RODS: Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, flexible and resilient, with 5-10 psi compression strength for 25% deflection.
 - H. SPEAK PORTS: Stainless steel round speak port cover with front and back plates, louver type opening.
- 2.04 FABRICATION: Fabricate glass to sizes required for glazing openings indicated, with edge clearances and tolerances complying with recommendations of glass manufacturer. Provide thickness indicated or, if not otherwise indicated, as recommended by glass manufacturer for application indicated.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

A. REFER TO DIVISION 1 for General Requirements

- 1. Glazier required to inspect work of glass framing erector for compliance with manufacturing and installation tolerances, including those for size, squareness, offsets at corners; for presence and functioning of weep system; for existence of minimum required face or edge clearances; and for effective sealing of joinery. Obtain Glazier's written report listing conditions detrimental to performance of glazing work. Do not allow glazing work to proceed until unsatisfactory conditions have been corrected.

3.02 DELIVERY, STORAGE AND HANDLING:

- A. PROTECT GLASS AND GLAZING MATERIALS during delivery, storage and handling to comply with manufacturer's directions and as required to prevent edge damage to glass, and damage to glass and glazing materials from effects of moisture including condensation, of temperature changes, of direct exposure to sun, and from other causes.

3.03 PREPARATION

- A. JOB CONDITIONS: ENVIRONMENTAL CONDITIONS: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing material manufacturer or when joint substrates are wet due to rain, frost, condensation or other causes. Install glazing sealants only when temperatures are in middle third of manufacturer's recommended installation temperature range.
- B. SURFACE PREPARATIONS: CLEAN GLAZING CHANNELS and other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to substrates. Remove lacquer from metal surfaces where elastomeric sealants are indicated for use.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

- 1. GLAZING METHOD:
 - a. Wet/dry glazing system shall be used at all areas exposed to the elements.
 - b. Dry glazing system shall be used for interior glazing only.
- 2. GENERAL
 - a. COMPLY WITH COMBINED PRINTED RECOMMENDATIONS of glass manufacturers, of manufacturers of sealants, gaskets and other glazing materials, except where more stringent requirements are indicated, including those of referenced glazing standards.
 - b. GLAZING CHANNEL DIMENSIONS as indicated in details are intended to provide for

necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by job conditions at time of installation.

- c. PROTECT GLASS FROM EDGE DAMAGE during handling and installation; use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass with flares or bevels along one horizontal edge which would occur in vicinity of setting blocks so that these are located at top of opening. Remove from project and dispose of glass units with edge damage or other imperfections of kind that, when installed, weakens glass and impairs performance and appearance.
 - d. APPLY PRIMERS TO JOINT SURFACES where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
3. GLAZING:
- a. INSTALL SETTING BLOCKS of proper size in sill rabbet, located one quarter of glass width from each corner, but no closer than 6", unless otherwise required. Set blocks in thin course of sealant which is acceptable for heel bead use.
 - b. PROVIDE SPACERS inside and out, of proper size and spacing to preserve required face clearances, for glass sizes larger than 50 united inches, except where gaskets or pre-shimmed tapes with continuous spacer rods are used for glazing. Provide 1/8" minimum bite of spacers on glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed thickness of tape.
 - c. PROVIDE EDGE BLOCKING to comply with requirements of referenced glazing standard, except where otherwise required by glass unit manufacturer.
 - d. SET UNITS OF GLASS in each series with uniformity of pattern, draw, bow and similar characteristics.
 - e. PROVIDE COMPRESSIBLE FILLER RODS or equivalent back-up material, as recommended by sealant and glass manufacturers, to prevent sealant from extruding into glass channel weep systems and from adhering to joints back surface as well as to control depth of sealant for optimum performance, unless otherwise indicated.
 - f. FORCE SEALANTS INTO GLAZING CHANNEL to eliminate voids and to ensure complete "wetting" or bond of sealant to glass and channel surfaces.
 - g. TOOL EXPOSED SURFACES of sealants to provide a substantial "wash" away from glass. Install pressurized tapes and gaskets to protrude slightly out of channel, so as to eliminate dirt and moisture pockets.
 - h. WHERE WEDGE-SHAPED GASKETS ARE DRIVEN into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage to ensure that gasket will not "walk" out when installation is subjected to movement.
 - i. MITER CUT WEDGE-SHAPED GASKETS at corners and install gaskets in manner recommended by gasket manufacturer to prevent pull away at corners; seal corner joints and butt joints with sealant recommended by gasket manufacturer.
 - j. MIRROR CLIPS: Set mirrors with metal clips, securely fastened into wall.
 - i. Use a felt or plastic pad between the mirror and each clip to prevent spalling the edges of the mirror.
 - ii. Mirrors should not be mounted next to unpainted plaster, wood, plywood, concrete or concrete block walls. These surfaces must be painted to prevent potential damage to the mirror.
 - iii. Mirrors should be mounted plumb and in-plane to avoid distorting reflected images.
 - iv. Space for air circulation and elimination of condensation should always be provided between the back of the mirror and the wall.

B. COORDINATION WITH OTHER WORK – NOT USED

3.05 FIELD QUALITY CONTROL

A. Site Tests, Inspection

1. EXAMINE GLASS SURFACES adjacent too or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less often than once a month, for build-up of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. PROTECT EXTERIOR GLASS FROM BREAKAGE immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surfaces of glass. Remove nonpermanent labels and clean surfaces.
- B. PROTECT GLASS FROM CONTACT WITH CONTAMINATING SUBSTANCES resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer.
- C. REMOVE AND REPLACE GLASS which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.
- D. WASH GLASS on both faces not more than 4 days prior to date scheduled for inspections intended to establish date of substantial completion in each area of project. Wash glass by method recommended by glass manufacturer.

PART 4 SCHEDULES

4.01 GLAZING TYPES:

- A. ENTRY AND EXTERIOR GLAZING (**Mark A**): Entrance glazing shall be 1 inch insulating tinted tempered
- B. INTERIOR GLAZING (**Mark B**): All interior glazing not indicated otherwise shall be 1/4 inch clear tempered.
- C. WIRE GLAZING (**Mark C**): Interior glazing indicated shall be 1/4-inch clear wire glass. Wire pattern to be square.

END OF SECTION

DIVISION - 9 FINISHES

- 09 29 00 GYPSUM DRYWALL
- 09 30 00 TILE
- 09 51 00 ACOUSTICAL CEILINGS
- 09 65 00 RESILIENT FLOORING
- 09 68 00 CARPETING
- 09 91 00 PAINTING

END OF SECTION

GYPSUM DRYWALL 09 29 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Provide and install gypsum drywall systems and accessories where shown on the drawings, as specified herein and as needed for a complete and proper installation. All surfaces are to be finished smooth unless noted otherwise. All edges and terminations are to finish unless concealed. Gypsum systems include - Gypsum drywall, screw-type metal support system and drywall finishing (joint tape and compound treatment). Typical furring material will be hat channel sections with 'z' furring typically only at rigid insulation conditions. Vinyl trim materials are to be used at areas with probable condensation.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. The USG Gypsum Construction Handbook; latest edition.
- B. ASTM C955 – Standard Specification for Cold-Formed Steel Structural Framing Members; latest edition.
- C. ASTM C1513 - Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections; latest edition.
- D. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; latest edition.
- E. AISI – Standard for Cold-Formed Steel Framing General Provisions; latest edition.
- F. AISI - North American Specification for the Design of Cold-Formed Steel Structural Members; latest edition.
- G. AWS D1.3 / D1. 3M - Structural Welding Code; latest edition.

1.03 SUBMITTALS

- A. PRODUCT DATA: Submit manufacturer's product specifications and installation instructions for each gypsum drywall component, including other data as may be required to show compliance with these specifications.
- B. SHOP DRAWINGS – For Load bearing conditions only.
 - 1. Submit shop drawings showing plans, sections, elevations, joint layouts, profiles and product component locations, including anchorage, bracing, fasteners, accessories and finishes.
 - 2. Show connection details with screw types and locations, weld lengths and locations, and other fastener requirements.

C. SAMPLES – NOT USED

1.04 QUALITY ASSURANCE

- A. FIRE-RESISTANCE RATING: Where gypsum drywall systems are shown or required with fire-resistance ratings, provide materials and installations which are identical with those of applicable assemblies tested per ASTM E119 by fire testing laboratories acceptable to authorities having jurisdiction including Underwriters Laboratories (UL) and American Insurance Association (AIA).
- B. SINGLE-SOURCE RESPONSIBILITY: Obtain gypsum board products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum boards.

- C. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section
- D. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, and manufacturer's installation instructions.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

A. CEILING SUPPORT MATERIALS AND SYSTEMS:

1. GENERAL: Size ceiling support components to comply with ASTM C754 unless otherwise indicated.
2. MAIN RUNNERS: Steel channels with rust inhibitive paint finish, hot or cold-rolled.
3. HANGER WIRE: ASTM A641 / A641M, soft, Class 1 galvanized.
4. HANGER RODS AND FLATS: Mild steel with zinc or equally rust inhibitive coating for rods and zinc or rust-inhibitive paint finish for flats.
5. ANGLE-TYPE HANGERS: Not less than 7/8" x 7/8" x 16-gauge galvanized steel formed angles, with bolted connections and 5/16" diameter bolts.
6. HANGER ANCHORAGE DEVICES: Screws, clips, bolts, cast-in-place concrete inserts or other devices applicable to the indicated method of structural anchorage for ceiling hangers and whose suitability for use intended has been proven through standard construction practices or by certified test data. Size devices for 3x calculated load supported except size direct pull-out concrete inserts for 5x calculated loads.
7. FURRING MEMBERS: ASTM C645; 25-gauge minimum thickness of base metal, hat-shaped.
8. FURRING MEMBERS: ASTM C645; 20-gauge minimum thickness of base metal, "C"-shaped studs.
9. FURRING ANCHORAGES: 16-gauge galvanized wire ties, manufacturer's standard wire-type clips, bolts, nails or screws as recommended by furring manufacturer and complying with C754.
10. DIRECT SUSPENSION SYSTEMS: Manufacturer's standard zinc-coated or painted steel system of furring runners, furring tees, and accessories designed for concealed support of gypsum drywall ceilings; of proper type for use intended.

B. WALL/PARTITION SUPPORT MATERIALS:

1. STUDS: ASTM C645; 25-gauge minimum thickness at Non-bearing up to 12'-0" unbraced at 16" on center, 20-gauge minimum at Non-bearing above 12'-0" unbraced 16" on center and 18-gauge minimum thickness at bearing walls of base metal unless otherwise indicated.
 - a. DEPTH OF SECTION: 3-5/8", except as otherwise indicated.
 - b. RUNNERS: Match studs; type recommended by stud manufacturer for floor and ceiling support of studs, and for vertical abutment of drywall work at other work.

2. FURRING MEMBERS: ASTM C645; 25-gauge minimum thickness of base metal, hat-shaped.
 3. Z-FURRING MEMBERS: Manufacturer's standard screw-type galvanized steel, "z"-shaped furring members; ASTM A893 / A893M, G60, 25-gauge minimum thickness of base metal; of depth indicated; designed for mechanical attachment of insulation boards or blankets to monolithic concrete and masonry walls.
 4. FASTENERS FOR FURRING MEMBERS: Type and size recommended by furring manufacturer for the substrate and application indicated.
- C. GYPSUM BOARD:
1. GYPSUM BOARD: ASTM C36, of types, edge configuration and thickness indicated below; in maximum lengths available to minimize end-to-end butt joints.
 - a. TYPE: Type X fire-resistant rated except where indicated otherwise.
 - b. EDGES: Tapered.
 - c. THICKNESS: 5/8", unless otherwise indicated.
 2. WATER-RESISTANT GYPSUM BOARD: ASTM C630, with tapered edges and of type and thickness indicated below; in maximum lengths available to minimize end-to-end butt joints.
 - a. TYPE: Regular or Type X for fire-resistant rated assemblies and where indicated for use on walls / ceiling of moisture areas.
 - i. THICKNESS: 5/8", unless otherwise indicated.
- D. GYPSUM SHEATHING (GPSHT): Provide 1/2" thick gypsum board complying with ASTM C1396 / C1396M and the following:
1. Water-repellent treated core with water absorption of less than 10% by weight after 2-hr. immersion ASTM C473.
 2. SIZE AND EDGES: 2'-0" wide x 8'-0" long with "V"-shaped tongued-and-grooved long edges, and square short edges.
- E. TRIM ACCESSORIES:
1. GENERAL: Provide manufacturer's standard trim accessories of types indicated for drywall work, formed of galvanized steel unless otherwise indicated, with either knurled and perforated or expanded flanges for nailing or stapling, and beaded for concealment of flanges in joint compound. Provide corner beads, L-type edge trim-beads, U-type edge trim-beads, special L-kerf-type edge trim-beads, and one-piece control joint beads.
- F. JOINT TREATMENT MATERIALS:
1. GENERAL: ASTM C475 / C475M; type recommended by the manufacturer for the application indicated, except as otherwise indicated.
 2. JOINT TAPE: Shall be the following:
 - a. Paper reinforcing tape.
 - b. Joint tape with metal strips.
 - c. Glass-fiber tape.
 3. JOINT COMPOUND: On interior work provide chemical-hardening-type for bedding and filling, ready-mixed vinyl-type or vinyl-type powder type for topping.
 4. WATER-RESISTANT JOINT COMPOUND: Special water-resistant type for treatment of joints, fastener heads and cut edges of water-resistant board. Subject to compliance with requirements provide Sheetrock Brand W/R Compound: United States Gypsum Co.
- G. MISCELLANEOUS MATERIALS:
1. GENERAL: Provide auxiliary materials for gypsum drywall work of the type and grade recommended by the manufacturer of the gypsum board.

2. LAMINATING ADHESIVE: Special adhesive or joint compound specifically recommended for laminating gypsum boards.
 3. GYPSUM BOARD SCREWS: Comply with ASTM C646.
 4. ACOUSTICAL SEALANT: Nondrying, nonhardening, non-skinning, non-staining, nonbleeding, gunnable sealant for applications per ASTM C919 and as recommended by gypsum board manufacturer.
 5. WATER-RESISTANT ADHESIVE: USG Sheetrock brand Durabond Joint Compound base coat and backfill or approved equal per ASTM C475.
- H. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
1. METAL SUPPORT MATERIALS:
 - a. ClarkDietrich Industries, Inc. Pittsburgh, PA, <https://www.clarkdietrich.com/>
 - b. SCAFCO Steel Stud Manuf., Co. Spokane, <https://www.scafco.com/>
 - c. United States Gypsum Co., Chicago, IL, <https://www.usg.com/content/usgcom/en.html>
 2. GYPSUM BOARD AND RELATED PRODUCTS:
 - a. American Gypsum Co., Albuquerque, NM, <https://www.americangypsum.com/>
 - b. Georgia-Pacific Corp., Atlanta, GA., <https://www.gp.com/>
 - c. Gypsum Co. Charlotte, NC, <https://nationalgypsum.com/index.htm>
 - d. United States Gypsum Co., Chicago, IL, <https://www.usg.com/content/usgcom/en.html>

2.02 FINISHES

- A. Provide the levels of finish described below in the area or areas where such level is called for on the Drawings. Level "4" Finish shall be provided at all areas unless specified otherwise.
- B. GENERAL: Apply treatment at gypsum board joints (both directions), flanges of trim accessories, penetrations, fastener heads, surface defects and elsewhere as required to prepare work for decoration. Prefill open joints and rounded or beveled manufacturer.
- C. Definitions of finish:
1. Where "Level 1" is called for on the Drawings:
 - a. At all joints and interior angles, apply tape embedded in joint compound;
 - b. Leave surfaces free of excess joint compound;
 - c. Tool marks and ridges are acceptable;
 - d. Generally used in plenum areas above ceilings, in attics, in areas where the assembly is concealed, and in building service corridors and other areas not normally open to the public.
 2. Where "Level 2" is called for on the Drawings:
 - a. At all joints and interior angles, apply tape embedded in joint compound, and apply one separate coat of joint compound over all joints, angles, fastener heads, and accessories;
 - b. Leave surfaces free of excess joint compound;
 - c. Tool marks and ridges are acceptable;
 - d. Generally used where water resistant gypsum backing board is used as a substrate for tile, and in warehouse storage areas, garages, and similar areas where surface appearance is not of primary importance.
 3. Where "Level 3" is called for on the Drawings:
 - a. At all joints and interiors angles, apply tape embedded in joint compound, and apply two separate coats of joint compound over all joints, angles, fasteners heads, and accessories;
 - b. Leave surfaces smooth and free of tool marks and ridges;
 - c. Generally used in appearance areas which are to receive medium to heavy texture finishes before final painting, or where heavy grade wallcoverings are to be applied as the final decoration.
 4. Where "Level 4" is called for on the Drawings:

- a. At all joints and interior angles, apply tape embedded in joint compound, and apply three separate coats of joint compound over all the joints, angles, fastener heads, and accessories;
- b. Leave surfaces smooth and free of tool marks and ridges;
- c. Generally used in appearance areas which are to receive light texture finishes before final painting, or where light grade wallcoverings are to be applied as the final decoration.

D. APPLY JOINT TAPE at joints between gypsum boards.

E. APPLY JOINT COMPOUND in 3 coats (not including prefill of openings in base), and sand between last 2 coats and after last coat.

2.03 ACCESSORIES

A. Vinyl Trim

1. Corner beads for obtuse angles, L-type edge trim-beads, U-type edge trim-beads, special L-kerf-type edge trim-beads, and one-piece control joint beads
2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. CertainTeed, <https://www.certainteed.com/>
 - b. ClarkDietrich, <https://www.clarkdietrich.com/>
 - c. Phillips Manufacturing, <https://www.phillipsmfg.com/>
 - d. Trim-Tex, <https://www.trim-tex.com/>

2.04 FABRICATION - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING

A. Keep materials dry at all times. Protect against exposure to weather and contact with damp or wet surfaces.

3.03 PREPARATION

A. JOB CONDITIONS

1. ENVIRONMENTAL REQUIREMENTS, GENERAL: Comply with requirements of referenced gypsum board application standards and recommendations of gypsum board manufacturer, for environmental conditions before, during and after application of gypsum board systems.
2. COLD WEATHER PROTECTION: When ambient outdoor temperatures are below 55°F (13°C) maintain continuous, uniform, comfortable building working temperatures of not less than 55°F (13°C) for a minimum period of 48 hours prior to, during and following application of gypsum board and joint treatment materials or bonding of adhesives.
3. VENTILATION: Ventilate building spaces as required to remove water in excess of that required for drying of joint treatment material immediately after its application. Avoid drafts during dry, hot weather to prevent too rapid drying.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. INSTALLATION OF METAL SUPPORT SYSTEMS:
 - a. GENERAL:
 - i. METAL SUPPORT INSTALLATION STANDARD: Comply with ASTM C754.

- ii. DO NOT BRIDGE building expansion joints with support system, frame both sides of joints with furring and other support as indicated.
2. CEILING SUPPORT SUSPENSION SYSTEMS:
 - a. SECURE HANGERS to structural support by connecting directly to structure where possible, otherwise connect to inserts, clips or other anchorage devices or fasteners as indicated.
 - b. SPACE MAIN RUNNERS 4'-0" o.c. and space hangers 4'-0" o.c. along runners, except as otherwise shown.
 - c. LEVEL MAIN RUNNERS to a tolerance of 1/4" in 12'-0", measured both lengthwise on each runner and transversely between parallel runners.
 - d. WIRE-TIE or clip furring members to main runners and to other structural supports as indicated.
 - e. DIRECT-HUNG METAL SUPPORT SYSTEM: Attach perimeter wall track or angle wherever support system meets vertical surfaces. Mechanically join support members to each other and butt-cut to fit into wall track.
 - f. SPACE FURRING member 16" o.c., except as otherwise indicated.
 - g. INSTALL AUXILIARY FRAMING at termination of drywall work, and at openings for light fixtures and similar work, as required for support of both the drywall construction and other work indicated for support thereon.
3. WALL/PARTITION SUPPORT SYSTEMS:
 - a. INSTALL SUPPLEMENTARY FRAMING, BLOCKING AND BRACING at terminations in the work and for support of fixtures, equipment, services, heavy trim, grab bars, toilet accessories, furnishings and similar work to comply with details indicated or if not otherwise indicated, to comply with applicable published recommendations of gypsum board manufacturer, or if not available, of "Gypsum Construction Handbook" published by United States Gypsum Co.
 - b. 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.
 - c. INSTALL RUNNER TRACKS at floors, ceilings and structural walls and columns where gypsum drywall stud system abuts other work, except as otherwise indicated.
 - d. TERMINATE PARTITION STUD SYSTEM at 3" above ceiling line, except where indicated to be extended to structure or deck above. Brace partitions that terminate below structure to structure above with stud braces at wall ends and at 10'-0" o.c. maximum along wall run between corners. Minimum of 3 braces per wall run.
 - e. SPACE STUDS 16" o.c., unless otherwise indicated.
 - f. FRAME DOOR OPENINGS to comply with details indicated or if not otherwise indicated, to comply with applicable published recommendations of gypsum board manufacturer, or if not available, of "Gypsum Construction Handbook" published by United States Gypsum Co. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for jack studs) at head and secure to jamb studs.
 - i. Extend all vertical jamb studs to underside of floor or roof structure above, unless otherwise indicated.
 - g. FRAME OPENINGS OTHER THAN DOOR OPENINGS to comply with details indicated or if not indicated, in same manner as required for door openings; and install framing below sills of openings to match framing required above door heads.
 - h. SPACE WALL FURRING MEMBERS 16" o.c., unless otherwise indicated.
4. GENERAL GYPSUM BOARD INSTALLATION REQUIREMENTS:
 - a. GYPSUM BOARD APPLICATION AND FINISHING STANDARDS: ASTM C840 and GA 216.
 - b. INSTALL SOUND ATTENUATION BLANKETS as 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 courses 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 and a maximum of 1/2" above finish floor. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs.
 - 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" open space between boards. Do not force into place.
 - g. LOCATE END JOINTS over supports. 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 SUPPLEMENTARY FRAMING AND BLOCKING provided for additional support at openings and cutouts.
 - i. FORM CONTROL JOINTS and expansion joints with space between edges of boards, prepared to receive trim accessories.
 - j. COVER BOTH FACES of steel stud partition framing with gypsum board in concealed spaces (above ceilings, etc.), except in chase walls which are braced internally.
 - i. Except where concealed application is required for sound, fire, air or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. area and may be limited to not less than 75% of full coverage.
 - k. ISOLATE PERIMETER of nonload-bearing drywall partitions at structural abutments. Provide 1/4" to 1/2" space and trim edge with J-type semi-finishing edge trim. Seal joints with acoustical sealant.
 - i. FOR DOUBLE-LAYER PARTITION SYSTEMS, work above acoustical ceilings may be installed with base layer only.
 - l. SPACE FASTENERS in gypsum boards in accordance with referenced standards and manufacturer's recommendations, except as otherwise indicated.
5. METHODS OF GYPSUM DRYWALL APPLICATION:
- a. SINGLE-LAYER APPLICATION:
 - i. ON CEILINGS apply gypsum board prior to wall/partition board application to the greatest extent possible.
 - ii. ON PARTITIONS/WALLS apply gypsum board vertically (parallel) and provide sheet lengths which will minimize end joints.
 - iii. ON Z-FURRING MEMBERS apply gypsum board vertically (parallel) with no end joints. Locate edge joints over furring members.
 - b. WALL TILE BASE: Where drywall is base for thin-set ceramic tile and similar rigid applied wall finishes, install gypsum backing board.
 - i. AT SHOWERS, TUBS, service sinks, fixture walls and similar "wet" areas, install water-resistant backing board. Apply with uncut long edge at bottom of work, and space 1/4" above fixture lips. Seal ends, cut-edges and penetrations of each piece with water-resistant adhesive or, where recommended by backing board manufacturer, with water-resistant joint compound.
 - c. DOUBLE-LAYER APPLICATION: Install gypsum backing board for base layer and exposed gypsum board for face layer.
 - i. ON CEILINGS apply base layer prior to base layer application on walls/partitions; apply face layers in same sequence. Offset joints between layers at least 10". Apply base layers at right angles to supports unless otherwise indicated.
 - ii. ON PARTITIONS/WALLS apply base layer and face layers vertically (parallel) with joints of base layer over supports and face layer joints offset at least 10" with base layer joints.
 - iii. ON Z-FURRING MEMBERS apply base layer vertically (parallel) and face layer either vertically (parallel) or horizontally (perpendicular) with vertical joints offset

at least one furring member. Locate edge joints of base layer over furring members.

- d. SINGLE-LAYER FASTENING METHODS: Apply gypsum boards to supports with screws.
 - e. DOUBLE-LAYER FASTENING METHODS: Fasten both base layers and face layers separately to supports with screws. Apply base layer of gypsum board and face layer to base.
 - f. DIRECT-BONDING TO SUBSTRATE: Where gypsum board is indicated to be directly adhered to a substrate (other than studs, joists, furring members or base layer of gypsum board), comply with gypsum board manufacturer's recommendations, and temporarily brace or fasten gypsum board until fastening adhesive has set.
6. 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 by nailing or stapling in accordance with manufacturer's instructions and recommendations.
 - b. INSTALL METAL CORNER BEADS at external corners of drywall work.
 - c. INSTALL METAL EDGE TRIM whenever edge of gypsum board would otherwise be exposed or semi-exposed. Provide type with face flange to receive joint compound. 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 (zinc beaded-type USG No. 043 or equal) where indicated on plans. It is the contractor's responsibility to coordinate proper locations of control joints with the Architect – Engineer via the Construction Manager, prior to installation. If not indicated on plans provide control joints as follows:
 - i. Joint spacing shall be 20'-0" on center maximum.
 - ii. Maintain a minimum separation of 8'-0" between joints.
 - iii. Locate joints at door openings where possible.
 - iv. Locate joints at strike side of doors only.
 - v. Locate joints at one side of other openings or both sides of openings over 8'-0" wide.
 - vi. Extend joints full height of the gypsum board.
 - vii. 300 sq ft is the maximum area allowed between joints.
 - viii. Locate joints at change of substrate.
 - e. INSTALL joint tape with metal strips at any outside or inside corner less or greater than 90°, 135° or 120°.
7. GYPSUM WALL SHEATHING:
- a. Provide gypsum board sheathing where shown. Fasten to exterior face of stud framing for exterior walls. Use fasteners as recommended by the manufacturer. Keep perimeter fasteners 3/8" from edges and ends of board units. Fit boards tightly against each other and around openings.
 - b. INSTALL JOINT TAPE over clean, dry smooth surface. Apply joint tape to the horizontal joints first, followed by application to the vertical joints. Tape should be centered over the joints. Apply tension to the tape and press down firmly to secure adhesion to the board. Prime substrate before applying tape as recommended by the manufacturer.

B. COORDINATION WITH OTHER WORK – See Coordination specification for additional requirements.

3.05 FIELD QUALITY CONTROL - NOT USED

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. CLEANING, use necessary care to prevent scattering gypsum wallboard scraps and dust, and to prevent tracking gypsum and joint finishing compound onto floor surfaces.

- B. AT COMPLETION OF EACH SEGMENT of installation in a room or space, promptly pick up and remove from the working area all scrap, debris, and surplus material of this Section.
- C. PROVIDE FINAL PROTECTION and maintain conditions, in a manner suitable to Installer, which ensures gypsum drywall work being without damage or deterioration at time of substantial completion.

PART 4 SCHEDULES – NOT USED

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Tile includes the following work:
 - 1. All ceramic tile floors, base, and walls, including trim members complete with all item's incidental using the thin set application methods.
 - 2. All monolithic thresholds at transitions.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

- A. American National Standards Institute (ANSI), latest edition:
 - 1. A108.1– “American National Standard Specifications for Dry-set Portland Cement Mortar.”
 - 2. A108.1A – “Installation of Ceramic Tile in the Wet-set Method, with Portland Cement Mortar.”
 - 3. A108.1B – “Installation of Ceramic Tile, Quarry Tile on a Cured Portland Cement Mortar Setting Bed with Dry-set or Latex-Portland Mortar.”
 - 4. A108.3 – Chemical Resistant, Water-Cleanable, Tile-Setting and-Grouting Epoxy and Water-Cleanable Tile-Setting Epoxy Adhesive.”
 - 5. A108.4 – “Installation of Ceramic Tile with Organic Adhesives or Water-cleanable Tile-setting Epoxy Adhesive.”
 - 6. A108.5 – “Installation of Ceramic Tile with Dry-set Portland Cement Mortar or Latex-Portland Cement Mortar.”
 - 7. A108.6 – “Installation of Ceramic Tile with Chemical-resistant, Water Cleanable Tile-setting and -grouting Epoxy.”
 - 8. A108.8 – “Chemical-Resistant Furan Mortar and Grout.”
 - 9. A108.9 – “Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout.”
 - 10. A108.10 – “Installation of Grout in Tilework.”
 - 11. A108.3 – “American National Standard Specifications for Chemical Resistant, Water-Cleanable, Tile-Setting and-Grouting Epoxy and Water-Cleanable Tile-Setting Epoxy Adhesive.”
 - 12. A108.4 – “American National Standard Specifications for Modified Dry-set Cement Mortar.”
 - 13. A108.5 – “American National Standard Specifications for Chemical Resistant Furan Mortar and Grouts for Tile Installation.”
 - 14. A108.6 – “American National Standard Specifications for Cement Grouts for Tile Installation.”
 - 15. A108.8 – “American National Standard Specifications for Modified Epoxy Emulsion Mortar/Grout.”
 - 16. A136.1 – “American National Standard Specifications for Ceramic Tile.”
 - 17. Z97.1 – “Safety Glazing Materials Used in Buildings – Safety Performance Specifications and Methods of Test.”
- B. American Society for Testing and Materials (ASTM), latest edition:
 - 1. C136 / C136M – “Sieve Analysis of Fine and Coarse Aggregates.”
 - 2. C144 – “Standard Specification for Aggregate for Masonry Mortar.”
 - 3. C150 / C150M – “Standard Specification for Portland Cement.”
 - 4. C207 – “Standard Specification for Hydrated Lime for Masonry Purposes.”

5. C373 – “Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-Tile Fired Ceramic Whiteware Products.”
6. C503 / C503M – “Standard Specification for Marble Dimensional Stone (Exterior).”
7. C623 – “Standard Test Method for Young's Modulus, Shear Modulus, and Poisson's Ratio for Glass and Glass-Ceramics by Resonance.”
8. C627 – “Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester.”
9. C 847-14a – “Standard Specification for Metal Lath.”
10. C 933-14 – “Standard Specification for Welded Wire Lath.”
11. 15.02 – “Ceramic Whitewares.”
12. D87 – “Standard Test Method for Melting Point of Petroleum Wax (Cooling Curve).”
13. D226 / D226M – “Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.”
14. D4397 – “Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications.”
15. E90 – “Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.”
16. E413 – “Classification for Rating Sound Insulation.”

C. TCNA – “The TCNA Handbook for Ceramic, Glass and Stone Tile Installation, latest edition.

1.03 SUBMITTALS

A. PRODUCT DATA: Submit manufacturer's product specifications and installation instructions for each tile component, including other data as may be required to show compliance with these specifications.

B. SHOP DRAWINGS

1. Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, thresholds, and setting details.
2. Locate and detail expansion and control joints.

C. SAMPLES

1. Selection Samples: For each product requiring color/texture selection, provide full size samples for final selection.
2. Verification Samples: For each product, color, and texture selected, provide two full-size units representing actual color and texture of products to be installed.

1.04 QUALITY ASSURANCE

A. SINGLE SOURCE RESPONSIBILITY:

1. Obtain each type and color tile material required from single source.
2. Obtain setting and grouting materials from one manufacturer to ensure compatibility.
3. Furnish a 10-year guarantee from installation material manufacturer. The guarantee is inclusive of installation materials, finish product, and labor.
4. Obtain prefabricated edge protection and transition and movement profiles from one manufacturer to ensure compatibility.
5. Obtain membrane (if required) from same manufacturer as setting material or from manufacturer approved by setting material manufacturer to ensure compatibility.

B. MANUFACTURER QUALIFICATIONS:

1. Tile: Minimum [5] Five years' experience in manufacture of tile products.
2. Setting Materials: Minimum [10] Ten years' experience in manufacture of setting and grout materials specified.
3. Membrane: Minimum [5] Five years' experience in manufacture of membrane materials specified.

4. Installer Qualifications: Specializing in tile work having minimum of [5] Five years successful **documented experience** with work comparable to that required for this Project.
- C. CERTIFICATIONS:
1. Submit "Master Grade Certificate" for each type of ceramic, quarry, and paver tile in accordance with requirements of ANSI A137.1.
 2. Submit manufacturer's certifications that mortars, adhesives, and grouts are suitable for intended use.
 3. Conform to ANSI- Recommended Standard Specifications for Ceramic Tile - A137.1.
 4. Conform to TCA Ceramic Tile: The Installation Handbook.
 5. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers.
 6. Tile shall bear the seal of Tile Council of America, Inc. and be equal to or exceed Standard Grade.
- D. FIELD MOCK-UPS
1. For final review of each type tile, construct sample panel of approximately One Hundred [100] square feet.
 2. Install in location as directed by CM/Architect.
 3. Show workmanship of finished work and construction techniques.
 4. Approved field samples may remain as a part of the Work.
- 1.05 SYSTEM DESCRIPTION
- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.
- 1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE.
- A. Submit maintenance data under provisions of Section 01 77 00.
- B. Include cleaning methods, cleaning solutions recommended, stain removal methods, and polishes and waxes recommended.
- C. Extra Materials - At completion of project, deliver to Owner extra stock of materials used on project as follows:
1. One carton of each color of floor tile.
 2. One carton of each color of wall tile.
 3. Six lineal feet of each color and type of base.
 4. Store in location as directed by Owner.
 5. Ensure materials are boxed and identified by manufacturer, type, and color.

PART 2 PRODUCTS

2.01 MATERIALS / EQUIPMENT

A. GENERAL

1. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types, compositions, and grades of tile indicated.
2. Furnish tile complying with "Standard Grade" requirements unless otherwise indicated.
3. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.
4. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
 - a. Match color, texture, and pattern indicated by reference to manufacturer's standard designations for these characteristics.
 - b. Provide selections made by Architect from manufacturer's full range of standard colors,

textures, and patterns for products of type indicated.

- c. Provide tile trim and accessories that match color and finish of adjoining flat tile unless noted otherwise.
 5. Factory Blending: For tile exhibiting color variations within the ranges selected during sample submittals, blend tile in factory and package accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.
 6. Mounting: Where factory-mounted tile is required, provide back-face or edge-mounted tile assemblies as standard with manufacturer unless another mounting method is indicated.
 7. Where tile is indicated for installation, on exteriors or in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies that this type of mounting is suitable for these kinds of uses and has been successfully used on other projects.
- B. Subway Ceramic Wall Tile
1. System Description
 - a. Grade: ANSI A137.1; 5.0 to 10.0 percent water absorption.
 - b. Size: 6 x 16 by 3/8 inches (nominal).
 - c. Edge: Cushioned.
 - d. Finish: Bright Glazed
 - e. Color: To be selected
 - f. Base: Matching cove base units, 4 inches high
 - g. Style/Pattern, Color: To be selected from manufacturers' price range 1, 2 or 3.
- C. Ceramic Floor Tile
1. System Description
 - a. Grade: ANSI/A137.1; 0.5 to 3.0 percent water absorption.
 - b. Type & Size: porcelain ceramic mosaic tile, 2" x 2" x 1/4", 2 x 2 x 1/16 inches (nominal factory mounted, plain face).
 - c. Edge: square edges except cushion edge at corner.
 - d. Static Coefficient of Friction: 0.60 minimum, ASTM 15.02.
 - e. Finish: unglazed, slip resistant finish
 - f. Style/Pattern, Color: To be selected from manufacturers' price range 1, 2, or 3.
- D. MANUFACTURER: Subject to compliance with requirements indicated herein, provide products of one of the listed manufacturers of acceptable equivalent:
- a. Dal-Tile Corp., Dallas, TX.; <https://www.daltile.com/>
 - b. American Olean, Dallas, TX.; <https://americanolean.com/>
 - c. Florida Tile Industries, Inc., Lakeland, FL; <https://www.floridatile.com/>

2.02 FINISHES – See section above.

2.03 ACCESSORIES

A. THRESHOLDS:

1. Synthetic Thresholds
 - a. Type: Corian
 - b. Color: To be selected from Grade C Type
 - c. Finish: Mat.
 - d. Size: 4 by 1/2 inch by full width of wall or frame opening.
 - e. Edges: Beveled one side when abutting other floor surfaces, and both sides when abutting other ceramic tile, radiused edges from bevel to vertical face.

B. TRIMMERS

1. Provide necessary caps, stops, returns, trimmers and other shapes to complete installation.
 2. Color and finish to match wall tile.
- C. MORTAR, GROUT, AND ADHESIVE MANUFACTURERS
1. Acceptable Manufacturers: Subject to compliance with requirements herein, provide products from one of the following manufacturers.
 2. Custom Building Products, Seal Beach, CA.
 3. Laticrete International, Inc., Bethany, CT
 4. Mapei Corporation, Deerfield, FL.
 5. Substitutions: Under provisions of specifications.
- D. MORTAR MATERIALS –
1. THIN SET BEDS
 - a. Portland Cement with Latex Additive; Thin-Set
 - i Description: Latex additive and site mixed portland cement mortar. Complying with ANSI A108 / A118 / A136.
 - ii Quantity: As recommended by latex additive manufacturer.
 - iii Acceptable Products:
 - (A) VersaBond™ Professional Thin-Set Mortar by Custom Building Products.
 - (B) 4237 Latex Thin set Mortar Additive by Laticrete.
 - (C) Keracrete System consisting of KER 303 Latex mixed with 1:1 sand/cement blend.by Mapei.
 - (D) 4237 Latex Thinset Mortar Additive mixed with 211 Crete Filler Powder by Laticrete.
 - (E) 3701 Mortar Admix mixed with premium floor and thin set by Laticrete.
 - (F) Keralastic System consisting of Keralastic polymer additive and Kerabond dry-set mortar by Mapei.
 - (G) Keraply System consisting of Keraply Acrylic Latex and Keraset Dry-Set Mortar.
 - b. Quick Setting Thin-Set Mortar:
 - i Description: Fast-setting, second generation, two-component mortar consisting of latex additive and mortar; comply with ANSI A118.4. Cures completely with no residual moisture in 24 hours.
 - ii Acceptable Products:
 - (A) RapidSetting Commercial Bonding Mortar mixed with CustomFlex™ Ultra-Strength Thin-Set Additive by Custom Building Products.
 - (B) 3701 Mortar Admix with 253 Rapid-Flex Thin-Set Mortar by Laticrete.
 - (C) Grani/Rapid System consisting of Grani/Rapid powder and PRP318 latex additive by Mapei.
 2. GROUT
 - a. Latex-Modified Grout:
 - i Description: Latex-modified, factory blended, mildew resistant, sanded, grout consisting of portland cement, graded quartz and additives; comply with ANSI A108 / A118 A136.
 - ii Latex Additive: Type as recommended by latex mortar manufacturer.
 - iii Acceptable Products:
 - (A) Polyblend® Sanded Tile Grout by Custom Building Products.
 - (B) Sattillo Grout Mix with Acrylic Mortar Admix 1:1 with water by Custom Building Products.
 - (C) 1500 Series Sanded Grout Mixed with 1776 Grout Admix Plus by Laticrete.
 - (D) KER 200 polymer-modified sanded grout by Mapei.
 - b. Unsanded Latex-Modified Grout for Wall Tile:

- i Description: Latex-modified, factory blended, mildew resistant, non-sanded, grout consisting of portland cement and additives; comply with ANSI A108 / A118 / A136.
- ii Latex Additive: Type as recommended by latex mortar manufacturer.
- iii Color: To be selected by architect.
- iv Acceptable Products:
 - (A) Polyblend® Non-Sanded Tile Grout by Custom Building Products.
 - (B) White Dry Tile Grout by Custom Building Products.
 - (C) 644 White Dry-Set Grout mixed with 17765 Grout Admix Plus by Laticrete.
 - (D) 1600 Series Tri-Poly Fortified Non-Sanded Grout by Laticrete.
 - (E) KER 800 polymer-modified unsanded grout by Mapei.
- 3. Reinforcing Mesh: 2 by 2-inch size weave of 16/16 wire size; welded fabric, galvanized.
- 4. Joint Backing: Closed cell foam polyethylene.
- 5. Expansion and Control Joints: Extruded aluminum profiles joined by a thermoplastic rubber insert, with integral perforated anchoring legs for setting the joint into the setting bed. Height: As required to suit application. Color As selected by Architect.

2.04 FABRICATION / Setting Methods

- A. Ceramic Mosaic Floors: Dry set portland cement mortar ANSI A108 / A118 / A136
- B. Walls: Thin set latex portland cement mortar. ANSI A108 / A118 / A136
- C. Ceramic Tile Grout: ANSI A108 / A118 / A136; latex-portland cement grout

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that areas to receive tile installed by thin bed method have wood float finish, are true within 1/4 inch in 10'-0" and are pitched to drains where required.
- B. Condition of Surfaces to Receive Tile:
 - 1. Firm, dry, clean and free of oily or waxy films, mortar and soil.
 - 2. Grounds, anchors, plugs, hangers, bucks, electrical and mechanical work in or behind tile installed.
- C. Air Temperature and Surfaces in Rooms to Receive Flooring: Between 60 degrees to 90 degrees F unless otherwise recommended by manufacturers of materials being installed.

3.02 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site in accordance with manufacturer's instructions
- B. Deliver materials in original, unopened, protective packaging with manufacturer's labels indicating brand name, pattern, size and thickness as applicable, legible and intact.
- C. Store materials in original protective packaging to prevent soiling, physical damage, or wetting.
- D. Protect adhesive from freezing or overheating in accordance with manufacturer's instructions.

3.03 PREPARATION

- A. JOB CONDITIONS - Conform to TCA Ceramic Tile: The Installation Handbook.
- B. Surface PREPARATIONS
 - 1. Clean substrates.
 - 2. Wet down or wash dry, dusty surfaces and remove excess water immediately prior to application of tiles.

3. Prepare surfaces in strict accordance with instructions of manufacturer whose setting materials or additives are being used.
4. Acid Based Cleaners: Use not permitted.
5. Scarify concrete substrates with blast track equipment if necessary, to completely remove curing compounds or other substances that would interfere with proper bond of setting materials. Clean and maintain substrate in condition required by setting material manufacturer.
6. Do not seal substrate unless required by manufacturer.
7. Prime substrate when required by manufacturer.

3.04 CONSTRUCTION

A. INSTALLATION:

1. General
 - a. Install tile materials in accordance with ANSI A137.1, other referenced ANSI and TCA specifications, and TCA "Handbook for Ceramic Tile Installation", except for more stringent requirements of manufacturer or these Specifications.
 - b. Cut and fit tile tight to protrusions and vertical interruptions and treat with a compatible sealant as specified. Form corners and bases neatly.
 - c. Work tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joint watertight, without voids, cracks, excess mortar, or grout.
 - d. Prepare surface, fit, set, bond, grout and clean in accordance with applicable requirements of ANSI standards and Tile Council of America.
2. Layout
 - a. Lay out work to pattern indicated so that full tile or joint is centered on each wall and no tile of less than half width need be used. Do not interrupt pattern through openings. Lay out tile to minimize cutting and to avoid tile less than half size.
 - b. For heights stated in feet and inches, use courses of full tile to produce nearest attainable heights without cutting tile.
 - c. No staggered joints will be permitted.
 - d. Align joints in tile in both directions.
 - e. Align joints between floor and base tile.
 - f. Make joints between sheets of tile exactly same width as joints within sheet.
 - g. File edges of cut tile smooth and even.
 - h. Cut and fit tile at penetrations through tile. Do not damage visible surfaces. Carefully grind edges of tile abutting built-in items. Fit tile at outlets, piping and other penetrations so that plates, collars, or covers overlap tile.
 - i. Extend tile work into recesses and under or behind equipment and fixtures, to form complete covering without interruptions, except as otherwise indicated. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignments.
 - j. Accurately form intersections and returns.
 - k. Form internal angles coved and external angles bullnosed.
 - l. At base/cove installations use the Flush method as defined by the Handbook for TCA Installation Handbook, unless noted otherwise.
3. Control Joints and Other Sealant Usage
 - a. Install control joints where tile abuts retaining surfaces such as perimeter walls, curbs, columns, wall corners and directly over cold joints and control joints in structural surfaces conforming to architectural details.
 - b. Install control joint in floors at spacings as indicated in TCA Installation Handbook, unless noted otherwise.
 - c. Rake or cut control joints through setting bed to supporting slab or structure. Keep joints free of mortar.
 - d. Install in accordance with TCA Installation Handbook.
 - e. Fill joints with self-leveling polyurethane sealant and backing material as specified.
4. Expansion Joints:

- a. Keep expansion joints free of mortar and grout.
- b. Use manufacturer's expansion joint flashing when covering expansion joints with waterproof or crack isolation membranes.
- c. Provide expansion joints directly over changes in material, over control and expansion joints in substrate, at juncture of floors and walls, at other restraining surfaces such as curbs, columns, bases, and wall corners, and where recommended by TCA EJ171 Expansion Joint requirements.
- d. Install sealant in expansion joints.
- e. Provide sealant material at items penetrating tile work, unless otherwise indicated.

B. COORDINATION WITH OTHER WORK – as specified.

3.05 FIELD QUALITY CONTROL – NOT USED

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

A. ADJUSTING: Sound tile after setting. Replace hollow sounding units.

B. CLEANING

1. Clean excess mortar from surface with water as work progresses. Perform cleaning while mortar is fresh and before it hardens on surfaces.
2. Sponge and wash tile diagonally across joints. Polish with clean dry cloth
3. Remove grout haze following recommendation of mortar additive manufacturer. Do not use acids for cleaning.
4. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

C. PROTECTION

1. Prohibit traffic from floor finish for 72 hours after installation.
2. Where temporary use of new floors is unavoidable, supply large, flat boards or plywood panels for walkways over kraft paper.
3. Protect work so that it will be without any evidence of damage or use at time of acceptance.

PART 4 SCHEDULES – NOT USED

END OF SECTION

ACOUSTICAL CEILINGS 09 51 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Install 2 x2 system at all locations. Acoustical ceilings include all acoustical panel ceilings and related exposed suspension components and systems.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. ASTM A1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened and Bake Hardenable; latest edition.
- B. ASTM A641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; latest edition.
- C. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; latest edition.
- D. ASTM C423 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; latest edition.
- E. ASTM C635 Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; latest edition.
- F. ASTM C636 Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; latest edition.
- G. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials; latest edition.
- H. ASTM E1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum; latest edition.
- I. ASTM E1111 Standard Test Method for Measuring the Interzone Attenuation of Open Office Components; latest edition.
- J. ASTM E1264 Classification for Acoustical Ceiling Products; latest edition.
- K. ASTM E1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers; latest edition.
- L. ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; latest edition.
- M. ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Material; latest edition.

1.03 SUBMITTALS

- A. PRODUCT DATA: Manufacturer's product specifications and installation instructions for each acoustical ceiling material required, and for each suspension system, including certified laboratory test reports and other data as required to show compliance with these specifications.
- B. SHOP DRAWINGS – NOT USED
- C. SAMPLES
 - 1. Verification Samples: Two samples, minimum size 4 by 7 inches, representing actual panel product.
 - 2. Verification Samples: Two samples, minimum 12 inches long, representing actual suspension system.

1.04 QUALITY ASSURANCE

- A. QUALIFICATIONS: Firm, which is acceptable to manufacturer of acoustical units, as shown by current written statement from manufacturer.
 - B. FIRE PERFORMANCE CHARACTERISTICS: Provide acoustical ceiling components that are identical to those tested for the following fire performance characteristics, according to ASTM test method indicated, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction. Identify acoustical ceiling components with appropriate marking of applicable testing and inspecting agency.
 - 1. SURFACE BURNING CHARACTERISTICS: As follows, tested per ASTM E84.
 - a. FLAME SPREAD: 25 or less.
 - b. SMOKE DEVELOPED: 50 or less.
 - 2. FIRE RESISTANCE RATINGS: As indicated by reference to design designation in UL "Fire Resistance Directory" or "FM Approval Guide", for floor, roof or beam assemblies in which acoustical ceilings function as a fire protective membrane; tested per ASTM E119. Provide protection materials for lighting fixtures and air ducts to comply with requirements indicated for rated assembly.
 - C. COORDINATION OF WORK: Coordinate layout and installation of acoustical ceiling units and suspension system components with other work supported by or penetrating through, ceilings, including light fixtures, HVAC equipment, fire suppression- system components, and partition system.
- 1.05 SYSTEM DESCRIPTION
- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.
 - B. DESIGN / PERFORMANCE REQUIREMENTS – NOT USED
- 1.06 WARRANTY
- A. Commercial Suspension Systems Ten (10) Years
 - B. Suspension Systems Components One (1) Year
- 1.07 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.
- A. EXTRA MATERIALS Deliver stock of maintenance material to Owner. Furnish maintenance material matching products installed, packaged with protective covering for storage and identified with appropriate labels.
 - 1. ACOUSTICAL CEILING UNITS: Furnish quantity of full-size units equal to 2.0% of amount installed.
 - 2. EXPOSED SUSPENSION COMPONENTS: Furnish quantity of each exposed component required for actual installation equal to 2.0% of amount installed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. PRODUCT: ACT
 - 1. Medium Texture, Mineral Fiber to be used in general areas as called for on the drawings.
 - 2. Dry felted to be used in general areas as called for on the drawings.
 - a. Based on Armstrong "Cortega"
 - b. Size: See Drawings
 - c. Thickness: 5/8"
 - d. Finish: Factory applied latex paint
 - e. Pattern: Non-directional fissured
 - f. Color: White
 - g. Edge: Square
 - h. Light Reflectance: LR 0.82
 - i. Noise Reduction Coefficient (NRC):0.55

- j. Ceiling Articulation Class (CAC): 33
- k. Fire Rating: A
- l. Suspension Grid: 15/16" exposed T, based upon Armstrong "Prelude XL", hot dipped galvanized steel

3. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:

- a. Armstrong World Industries, Inc., www.armstrong.com
- b. CertainTeed Corp., <https://www.certainteed.com/>
- c. US Gypsum, <https://www.usg.com/content/usgcom/en.html>
- d. Rockfon North America, <https://www.rockfon.com/>

2.02 MATERIALS

A. STANDARD FOR ACOUSTICAL CEILING UNITS: Provide manufacturer's standard units of configuration indicated which are prepared for mounting method designated and which comply with FS SSS118 requirements, including those indicated by reference to type, form pattern, grade (NRC or NIC as applicable), light reflectance coefficient (LR), edge detail, and joint detail (if any).

1. UL certified NRC in compliance with ASTM C 423 with UL label on product carton.

B. CEILING ATTENUATION CLASS: UL certified CAC in compliance with ASTM E 1414 with UL label on product carton.

2.03 FINISHES

A. See descriptions in 2.01.

B. Provide products to match appearance characteristics indicated or, if not otherwise indicated, as selected by Architect/Engineer from manufacturer's standard colors, surface textures, and patterns available for acoustical ceiling units and exposed metal suspension system members of quality designated.

2.04 ACCESSORIES

A. ACCESSORIES ACOUSTICAL SEALANT: Resilient, non-staining, non-shrinking, nonhardening, non-skinning, nondrying, non-sag sealant intended for interior sealing of concealed construction joints.

1. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:

- a. Tremco Acoustical Sealant; Tremco, <https://www.tremcosealants.com/>
- b. USG Acoustical Sealant; United States Gypsum Co., <https://www.usg.com/content/usgcom/en.html>
- c. Chem-Calk 600; Bostik, <https://www.bostik.com/>

B. Vertical transition using extruded aluminum Axiom Transitions – Armstrong or equal.

2.05 FABRICATION – NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING

A. DELIVER ACOUSTICAL CEILING UNITS to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination or other causes.

B. BEFORE INSTALLING ACOUSTICAL CEILING UNITS, permit them to reach room temperature and a stabilized moisture content.

C. HANDLE ACOUSTICAL CEILING UNITS carefully to avoid chipping edges or damaging units in any way.

3.03 PREPARATION

- A. JOB CONDITIONS Do not install interior acoustical ceilings until space is enclosed and weatherproof, wet work in space is completed and nominally dry, work above ceilings completed, and until ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. GENERAL: Install materials in accordance with manufacturer's printed instructions, and to comply with governing regulations, fire resistance rating requirements as indicated, and industry standards applicable to work.
2. ARRANGE ACOUSTICAL UNITS and orient directionally patterned units (if any) in manner shown by reflected ceiling plans.
 - a. INSTALL TILE with pattern running in one direction.
3. INSTALL SUSPENSION SYSTEMS to comply with ASTM C636, with hangers supported only from building structural members. Locate hangers not less than 6" from each end and spaced 4'0" along each carrying channel or direct hung runner, unless otherwise indicated, leveling to tolerance of 1/8" in 12'0".
 - a. SECURE WIRE HANGERS by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices which are secure and appropriate for substrate, and which will not deteriorate or fail with age or elevated temperatures.
 - b. INSTALL HANGERS PLUMB and free from contact with insulation or other objects within ceiling plenum which are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal force by bracing, counter splaying or other equally effective means.
4. INSTALL EDGE MOLDINGS of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units.
 - a. SEALANT BED: Apply continuous ribbon of acoustical sealant, concealed on back of vertical leg before installing moldings.
 - b. SCREWATTACH MOLDINGS to substrate at intervals not over 16" o.c. and not more than 3" from ends, leveling with ceiling suspension system to tolerance of 1/8" in 12'0". Miter corners accurately and connect securely.
5. INSTALL ACOUSTICAL TILE in coordination with suspension system. Place splines or flanges of suspension system into kerfed edges, or insert tile tongues into tile grooves, so that every tile to tile joint is closed by double lap of material.
 - a. FIT ADJOINING TILE to form flush, tight joints. Scribe and cut for accurate fit at borders and around penetrating work.
 - b. HOLD TILE FIELD IN COMPRESSION by inserting leaf type spring steel spacers between tile and moldings, spaced at 12" o.c.
 - c. FABRICATE ACCESS UNITS from special suspension system access members and tile units modified as required to allow for removal of access units.
6. INSTALL ACOUSTICAL PANELS in coordination with suspension system with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at borders and at penetrations.
 - a. INSTALL HOLDDOWN CLIPS in areas indicated, and in areas where required by governing regulations or for fire resistance ratings; space as recommended by panel manufacturer, unless otherwise indicated or required.
 - i. Kitchen Area
 - ii. Intake / Release
 - iii. Medical Unit
 - iv. Sallyport to Exterior of Building
7. INSTALL SUSPENSION SYSTEM in coordination with electrical fixtures.
 - a. RECESSED: Intermediate and heavy duty suspended ceiling systems may be used for the support of recessed lighting fixtures with the following qualifications:

- i. All recessed lighting fixtures shall be firmly affixed to the suspended ceiling system. Attachment shall have a capacity of 100% of the lighting fixture weight acting in any direction.
 - ii. Additional hanger wires will be connected to the suspended ceiling system on intermediate grid at points of lighting fixture corners but no more than 2" from each corner. In continuous runs, individual wires at points of lighting fixtures junction shall be considered as additional wires.
 - iii. Heavy duty suspended ceiling systems shall maintain a 4'0" modular hanger pattern. Special ceiling systems shall be permitted (i.e. typical 5 x 5 modular suspended ceiling systems) when engineering data demonstrates safety factors meet seismic standards for recessed lighting mounting. When suspended ceiling cross runners are used to support lighting fixtures, such cross runners shall provide the same carrying capacity as the main runners.
 - iv. Lighting fixtures weighing less than 20 lbs. and positively connected to the suspended ceiling system shall not require two safety wires direct to lighting fixture. Lighting fixtures weighing over 20 lbs. but no more than 56 lbs. shall have two #12 gage wires connected from fixture housing to structure or suspended ceiling hanger wires. These wires may be slack. Lighting fixtures weighing over 56 lbs. shall be supported direct from structure.
 - b. SURFACE MOUNTED: Surface mounted electrical fixtures shall be attached to the mechanical ceiling system with positive clamping devices which completely surround the supporting members. Slack wires shall attach to these clamping devices or directly to the fixture housing and the structure above or to adjacent support wires. A #12 gage hanger shall be attached to the carrying member within 8" of the fixture load point.
 8. INSTALL SUSPENSION SYSTEM in coordination with mechanical systems. Ceiling mounted air devices weighing 20 lb. or more shall be attached to the structure above. Devices less than 20 lbs. shall be positively attached to the suspension system main runners or to cross runners with the same configuration as the main runners unless deflection minimums are exceeded. Under no circumstances shall the suspended ceiling system be used to support ductwork, piping or equipment.
 - B. COORDINATION WITH OTHER WORK Furnish layouts for inserts, clips, or other supports required to be installed by other trades for support of acoustical ceilings.
 1. Furnish concrete inserts, steel deck hanger clips and similar devices to other trades for installation well in advance of time needed for coordination of other work.
- 3.05 FIELD QUALITY CONTROL
- A. REMOVE AND REPLACE work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.
- 3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK
- A. CLEAN EXPOSED SURFACES of acoustical ceilings, including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touchup of minor finish damage.

PART 4 SCHEDULES – NOT USED

END OF SECTION

RESILIENT FLOORING 09 65 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Resilient flooring and accessories located on the project and identified in the schedules in the documents.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. NPFA 258 - Recommended Practice for Determining Smoke Generation of Solid Materials; latest edition.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; latest edition.
- C. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; latest edition.
- D. ASTM E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials; latest edition.
- E. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; latest edition.
- F. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; latest edition.
- G. ASTM F1303 – Standard Specification for Sheet Vinyl Floor Covering with Backing; latest edition.
- H. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; latest edition.

1.03 SUBMITTALS

- A. PRODUCT DATA: Submit 2 copies of manufacturer's technical data and installation instructions for each type of resilient flooring and accessory.
- B. SHOP DRAWINGS – NOT USED
- C. SAMPLES: Submit, for verification purposes, samples of each type, color, and pattern of resilient flooring, including accessories, required, indicating full range of color and pattern variation. Provide full-size tile units, 6" x 9" samples of sheet flooring and 2-1/2" long sections of resilient flooring accessories.
 - 1. FOR INITIAL SELECTION OF COLORS AND PATTERNS submit, prior to above, samples in form of actual sections of resilient flooring, including accessories, showing full range of colors and patterns available, for each type of resilient flooring required.

1.04 QUALITY ASSURANCE

- A. MANUFACTURER: Provide each type of resilient flooring and accessories as produced by a single manufacturer, including recommended primers, adhesives, sealants, and leveling compounds.
 - 1. Wherever possible, provide required resilient flooring and accessories produced by a single manufacturer.
 - 2. FLAME SPREAD: Note more than 75 as per ASTM E84.
 - 3. SMOKE DEVELOPED: Note more than 450 as per ASTM E84.

4. SMOKE DENSITY: Not more than 450 as per NFPA 258.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

- A. MAINTENANCE INSTRUCTIONS: Submit 2 copies of manufacturer's recommended maintenance practices for each type of resilient flooring and accessory required.
- B. REPLACEMENT MATERIAL: After completion of work, deliver to project site replacement materials from same manufactured lot as materials installed, and as follows:
 1. TILE FLOORING, not less than one box for each 50 boxes or fraction thereof, for each type, size, and color installed.
 2. ACCESSORIES, not less than one box for each accessory type in size and color installed.

PART 2 PRODUCTS

2.01 MATERIALS / EQUIPMENT

A. PRODUCT: TILE FLOORING

1. VINYL COMPOSITION TILE (VCT): ASTM F1066 (FS SS-T-312), Type IV; 12" x 12" x 1/8" unless otherwise indicated, Composition 1 - asbestos-free.
- B. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 1. Armstrong World Industries, Inc., www.armstrong.com
 2. Tarkett, Inc., www.commercial.tarkett.com

2.02 FINISHES

- A. COLORS AND PATTERNS: As shown or scheduled, or as selected by Architect-Engineer from manufacturer's standards.

2.03 ACCESSORIES

A. WALL BASE (WL BS):

1. Provide base complying with FS SS-W-40; either Type I rubber or Type II vinyl, with matching end stops and preformed or molded corner units, and as follows:
 - a. HEIGHT: 4" x 1/8" thickness.
 - b. STYLE: Standard top-set cove.
 - c. FINISH: Matte.
2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Armstrong World Industries, Inc., www.armstrong.com
 - b. Johnsonite by Tarkett, Inc., www.commercial.tarkett.com
 - c. Flexco Div., Textile Rubber Co., Inc., <https://www.flexcofloors.com/>

B. RESILIENT EDGE STRIPS (RE ES):

1. 1/8" thick, homogeneous vinyl or rubber composition, tapered or bullnose edge, color to match flooring, or as selected by Architect-Engineer from standard colors available; not less than 1" wide.
 - a. MATERIAL: Extruded aluminum with mill finish, unless otherwise shown.
 - b. TYPE: Butt type metal edge strips for concealed anchorage.

2. MANUFACTURERS: See Accessories A.
- C. ADHESIVES (CEMENTS): Waterproof, stabilized type as recommended by flooring manufacturer to suit material and substrate conditions.
- D. CONCRETE SLAB PRIMER: Non-staining type as recommended by flooring manufacturer.
- E. LEVELING COMPOUND: Latex type as recommended by flooring manufacturer.
- F. POLISH: Provide polish with high grade 24% content for all vinyl tile floors.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVER tile and accessories to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage.

3.03 PREPARATION

A. JOB CONDITIONS

1. MAINTAIN MINIMUM TEMPERATURE of 65°F (18°C) in spaces to receive resilient flooring for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. Store resilient flooring materials in spaces where they will be installed for at least 48 hours before beginning installation. Subsequently, maintain minimum temperature of 55°F (13°C) in areas where work is completed.

B. SURFACE PREPARATIONS

1. INSTALL RESILIENT FLOORING AND ACCESSORIES after other finishing operations, including painting, have been completed. Do not install resilient flooring over concrete slabs until the latter have been cured and are sufficiently dry to achieve bond with adhesive as determined by manufacturer's recommended bond and moisture test.
2. AT REHAB AREAS where floors were previously covered, ensure that all mastic, sealers and other materials are completely removed, and floors prepared to receive new flooring.
3. BROOM CLEAN OR VACUUM surfaces to be covered and inspect subfloor. Start of flooring installation indicates acceptance of subfloor conditions and full responsibility for completed work.
 - a. USE LEVELING COMPOUND as recommended by flooring manufacturer for filling small cracks and depressions in subfloors.
 - b. PERFORM BOND AND MOISTURE TESTS on concrete slabs to determine that concrete surfaces are sufficiently cured, dried and ready to receive flooring.
 - c. APPLY CONCRETE SLAB PRIMER, if recommended by flooring manufacturer, prior to application of adhesive. Apply in compliance with manufacturer's directions.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. GENERAL

- a. INSTALL FLOORING using method indicated in strict compliance with Manufacturer's recommendations. Extend flooring into toe spaces, door reveals, and into closets and similar openings.
- b. MAINTAIN REFERENCE MARKERS, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent marking device.
- c. TIGHTLY CEMENT FLOORING to subbase without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections. Hand roll flooring at perimeter of each covered area to assure adhesion.

2. TILE FLOORS:
 - a. LAY TILE FROM CENTER MARKS established with principal walls, discounting minor offsets, so that tile at opposite edges of room area of equal width. Adjust as necessary to avoid use of cut widths less than 1/2 tile at room perimeters. Lay tile square to room axis, unless otherwise shown.
 - b. MATCH TILES FOR COLOR AND PATTERN by using tile from cartons in same sequence as manufactured and packaged if so numbered. Cut tile neatly around all fixtures. Broken, cracked, chipped, or deformed tiles are not acceptable.
 - i. Lay tile with grain running in alternating directions.
 - c. ADHERE TILE flooring to substrates using full spread of adhesive applied in compliance with flooring manufacturer's directions.
 3. ACCESSORIES:
 - a. APPLY WALL BASE to walls, columns, pilasters, casework and other permanent fixtures in rooms or areas where base is required. Install base in lengths as long as practicable, with preformed corner units, or fabricated from base materials with mitered or coped inside corners. Tightly bond base to substrate throughout length of each piece, with continuous contact at horizontal and vertical surfaces.
 - b. PLACE RESILIENT EDGE STRIPS tightly butted to flooring and secure with adhesive. Install edging strips at edges of flooring which would otherwise be exposed.
- 3.05 FIELD QUALITY CONTROL – NOT USED
- 3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK
- A. REMOVE ANY EXCESS ADHESIVE or other surface blemishes, using neutral type cleaners as recommended by flooring manufacturer. Protect installed flooring with heavy Kraft paper or other covering.
 - B. FINISHING: After completion of project and just prior to final inspection of work, thoroughly clean floors and accessories.
 - C. APPLY POLISH and buff to a high shine, with type of polish, number of coats, and buffing procedures in compliance with flooring manufacturer's instructions.

PART 4 SCHEDULES – NOT USED

END OF SECTION

CARPETING 09 68 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Carpeting is indicated on the drawings, finish schedule and by specifications, and is defined to include carpet, and accessories.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

REFERENCES – NOT USED

1.02 SUBMITTALS

- A. PRODUCT DATA Submit manufacturer's complete technical product data for each type of carpet, cushion and accessory item (i.e. adhesive) required. Sample book with 10 – 12 color selections needs to be provided for Architect to choose from for larger sample.
- B. SHOP DRAWINGS - Provide one (1) layout drawing that indicates location of carpet.
- C. SAMPLES: Submit 12" x 12" samples of each carpet required, 6" long samples of each type exposed edge stripping.
- D. Warranty: Provide special project warranty, signed by Contractor, Installer and Manufacturer (Carpet Mill), agreeing to repair or replace defective materials and workmanship of carpeting work during 2-year warranty period following substantial completion. Attach copies of product warranties.

1.03 QUALITY ASSURANCE

A. QUALIFICATIONS

- 1. INSTALLER QUALIFICATIONS: Firm with not less than 5 years of experience in installation of commercial carpeting of type, quantity and installation methods similar to work of this section.
- 2. MANUFACTURER QUALIFICATIONS: Firm (carpet mill) with not less than 5 years of production experience with carpet similar to types specified in this section; and whose published product literature clearly indicates general compliance of products with requirements of this section.

B. CERTIFICATIONS

- 1. Manufacturer's certification that products furnished for project meet or exceed regulatory and performance requirements included as part of System Description article.
- 2. Contractor's and installer's certification that products are installed in accordance with Contract Documents.
- 3. Manufacturer's certification that carpet furnished for project meets one of following requirements:
 - a. Indoor Air Quality Carpet Testing, Carpet and Rug Institute, include CRI Certification number (Green Label).
 - b. Air Quality Specification for Carpet, State of Washington.
 - c. EPA Guidelines for Total Volatile Organic Emissions.
- 4. Antimicrobial: Environmental Protection Agency registration numbers for antimicrobial agent in products furnished.

1.04 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

B. DESIGN / PERFORMANCE REQUIREMENTS

1. **GENERAL TERMINOLOGY/INFORMATION STANDARD:** Refer to current edition of "Carpet Specifier's Handbook" by The Carpet and Rug Institute; for definitions of terminology not otherwise defined herein, and for general recommendations and information.
 2. **FLAME/SMOKE RESISTANCE STANDARDS:** Where ratings are indicated for carpet or for carpet-plus-pad installations, provide materials complying with ratings as indicated for the following test standards:
 - a. **FLOOR RADIANT PANEL TEST:** Test for burning under varying radiant energy levels; ASTM E648, with minimum average radiant flux ratings not less than the following:
 - i) **FRPT RATING:** 0.22 watts/sq. cm.
 - b. **SMOKE DENSITY TEST:** Test in radiant heat chamber, with and without flame, for density of smoke generated; ASTM E662, or NFPA No. 258, also known as NBS Smoke Density Chamber Test.
 3. **FADE RESISTANCE:** Where a fade resistance factor is indicated for carpet or carpet materials, provide materials which have been tested by AATCC Test Method 16E, for a maximum grey scale factor of 4 when tested for a period of 40 hours except as otherwise indicated.
 4. **DENSITY FACTOR (PILE-TYPE CARPET):** Except as otherwise specified where a density factor is indicated, determine factor by FHA method to indicate measured pile weight in oz. per sq. yd., multiplied by 36, and divided by measured pile thickness (height); ASTM D418 for measurements.
 5. **STATIC RESISTANCE:** Provide yarn or yarn blend as indicated in carpet construction and include provisions to comply with static resistance ratings as indicated, either by selection of yarns known to be effective or by inclusion of small percentages of special antistatic yarn known to be effective in achieving indicated static resistance. Where rating is not otherwise indicated, provide 3.5 KV resistance for 20% RH at 70°F (21°C), AATCC 134.
 6. **STAIN RESISTANCE AND ANTIMICROBIAL PROTECTION:** Provide manufacturer recommended stain resistance and anti-microbial treatment.
- 1.05 **OWNER'S INSTRUCTIONS AND MAINTENANCE** - Refer to Section 01 77 00 for the General requirements for Contract Close-out.
- A. **Extra Materials: OVERRUN:** Where carpet is supplied from custom run at mill, produce and deliver to project at least 5% overrun on calculated yardage. Provide required overrun exclusive of carpet needed for proper installation, waste and usable scraps.

PART 2 PRODUCTS

2.01 MATERIALS / EQUIPMENT

A. CARPET

1. **CARPET CONSTRUCTION:** (refer to Kinetex by J&J Commercial)
 - a. **Construction:** Patterned loop
 - b. **Face Yarn:** Encore SD Ultima
 - c. **Face Weight:** 24 ounces
 - d. **Dye Method:** solution
 - e. **Gauge:** 1/12
 - f. **Pile Density:** 7516
 - g. **Back:** Nexus Modular
 - h. **Standard Size:** 24" x 24" approximately
 - i. **Standard Adhesive:** Commercialon Premium Modular Adhesive

2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. J & J Commercial, www.jjflooringgroup.com/
 - b. Mannington Commercial, www.manningtoncommercial.com/
 - c. Shaw Floors, www.shawfloors.com/flooring/carpet
 - d. Tarkett, Inc., www.commercial.tarkett.com

2.02 FINISHES – NOT USED

2.03 ACCESSORIES

A. CARPET ACCESSORIES:

1. CARPET EDGE GUARD, NONMETALLIC: Extruded or molded HEAVY-DUTY vinyl or rubber carpet edge guard of size and profile indicated and with minimum 2" wide anchorage flange; colors selected by Architect-Engineer from among standard colors available within the industry (any manufacturer).
2. INSTALLATION ADHESIVE: Water-resistant, nonstaining type as recommended by carpet or cushion manufacturer, and which complies with flammability requirements for installed carpet.
3. SEAMING CEMENT: Hot-melt seaming adhesive or similar product recommended by carpet manufacturer, for taping seams and buttering cut edges at backing to form secure seams and prevent pile loss at seams.
4. MISCELLANEOUS MATERIALS: As recommended by manufacturers of carpets, cushions and other carpeting products; and selected by Installer to meet project circumstance and requirements.

2.04 FABRICATION

- A. PILE THICKNESS (HEIGHT): Average height above backing, ASTM 07.01; provide thicknesses indicated.
- B. PILE FACE WEIGHT: Oz. per sq. yd. above backing; provide weights indicated.
- C. PRIMARY BACKING: Except as otherwise indicated, provide woven construction or sheet goods, of natural or synthetic fibers or nonwoven sheets, as applicable to carpet construction indicated, and appropriate for service and exposures indicated.
- D. BACK COATING: Liquid latex or polyurethane coating or manufacturer's similar equivalent coating as required for carpet stability and tuft bind as indicated. Unless otherwise indicated, provide tuft bind of not less than 20 lbs. for looped pile, ASTM D1335.
 1. TUFTED CARPET: Provide coating weight of not less than 26 oz. per sq. yd.
- E. SECONDARY BACKING: Provide 6.0 oz. per sq. yd. woven poly carpet backing or provide 3.5 oz. per sq. yd. woven synthetic fiber carpet backing. Laminate to primary backing with latex or similar adhesive recommended by manufacturer; provide a bond strength of 2 lbs. per in., Fed. Test Method Standard No. 191.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling, and Unloading
- B. Storage and Protection
 1. Store carpet materials in spaces where they will be installed for at least 48 hours before beginning installation.

2. Maintain minimum temperature of 65 F and maximum relative humidity of 65 percent for minimum of 24 hour prior to installation. Maintain temperature for 72 hours after installation.

3.03 PREPARATION

A. JOB CONDITIONS

1. EXAMINE and test concrete substrates for moisture content and other conditions such as slab PH under which carpeting is to be installed. Repair minor holes, cracks, depressions or rough areas using material recommended by carpet or adhesive manufacturer. Notify Contractor in writing of major conditions detrimental to proper completion of the work. Do not proceed until unsatisfactory conditions have been corrected. Do not install carpet until the concrete is properly cured.

B. SURFACE PREPARATIONS

1. Prepare Substrate: Test concrete substrate for pH and contaminants in accordance with manufacturer's recommendations. Ensure concrete is within manufacturers recommended limits prior to installation.
2. Remove ridges and bumps. Fill depressions, low spots, cracks, joints, holes, indentations, and other defects with leveling and patching compounds.
 - a. Mechanically abrade or shot-blast existing concrete flooring to remove inappropriate curing agents and to open pores of concrete surfaces to allow proper application of bonding agent, primer, or adhesive. Completely remove cleaning residue. Acid washing is not acceptable.
 - b. Repair cracks, divots and surface imperfections according to manufacturer's instructions.
 - c. Clean substrate to remove paint, dirt, oil, grease, sealers, release agents, hardening compounds, residual adhesives, and substances which could impair performance of adhesive materials.
 - d. Broom clean and vacuum surfaces to remove dust and debris.
3. Moisture Vapor Transmission Test: ASTM 15.04. Performed by independent testing laboratory to determine suitability of concrete subfloor for receiving flooring with regard to moisture content and curing compounds. Ensure concrete is within floor manufacturer's recommended limits prior to installation.
 - a. ASTM 15.04 Qualitative Anhydrous Calcium Chloride Test: For substrates with moisture vapor permeance in excess of 3 pounds water vapor per 1000 square feet per 24-hour period, use floor coating manufacturer's suggested remedy. Do not proceed with flooring application until the condition is corrected.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. GENERAL:
 - a. COMPLY WITH MANUFACTURERS' instructions and recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doors, center seams under doors; do not place seams in traffic direction at doorways.
 - b. LAY carpet with run or pile in same direction as anticipated traffic.
 - c. EXTEND CARPET under open-bottomed obstructions and under removable flanges and furnishings, and into alcoves and closets of each space.
 - d. PROVIDE CUT-OUTS where required, and bind cut edges properly where not concealed by protective edge guards or overlapping flanges.
 - e. INSTALL CARPET EDGE GUARD where edge of carpet is exposed, anchor guards to substrate.
 - f. EXPANSION JOINTS: Do not bridge building expansion joints with continuous carpeting, provide for movement.

2. GLUE-DOWN INSTALLATION:

- a. FIT SECTIONS OF CARPET into each space prior to application of adhesive. Trim edges and butter cuts with seaming cement.
- b. APPLY ADHESIVE uniformly to substrate in accordance with manufacturer's instructions. Butt carpet edges tightly together to form seams without gaps. Roll the entire carpet area lightly to eliminate air pockets and ensure uniform bond. Remove adhesive promptly from face of carpet.

B. COORDINATION WITH OTHER WORK

1. SEQUENCE carpeting with other work so as to minimize possibility of damage and soiling of carpet during remainder of construction period.

3.05 FIELD QUALITY CONTROL –

- A. The Contractor is responsible for any testing to the site

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. Cleaning: Clean as required by manufacturer. Do not use materials or methods which may damage the finish or surrounding construction.
1. Vacuum carpet using commercial machine with face-beater element.
 2. Remove spots in accordance with manufacturer's instructions. Replace the entire carpet where spots cannot be removed.

PART 4 SCHEDULES – NOT USED

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. GENERAL DESCRIPTION

1. WORK INCLUDES all preparation of surfaces to be painted, painting and finishing of interior and exterior items exposed to view and semi-view of surfaces throughout project, except as otherwise indicated.
 - a. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of work.
 - b. Colors will be selected by the Architect-Owner from manufacturer's color chart except for the following:
 - i. Steel Pipe Bollards- Safety Yellow, unless noted otherwise.
 - ii. Above ground exterior natural gas piping with one primer coat and two finish coats of exterior grade paint. Paint color shall be silver.
 2. "PAINT" as used herein means all coating systems materials including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.
 3. SURFACES TO BE PAINTED: Except where natural finish of material is specifically noted as a surface not to be painted, paint exposed surfaces whether or not colors are designed in "schedules". Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas. If color or finish is not designated, Architect-Engineer will select these from standard colors or finishes available.
 4. The following categories of work are not included as part of field-applied finish work.
 - a. PREFINISHED ITEMS: Unless otherwise indicated, do not include painting when factory-finishing or installer finishing is specified for such items as (but not limited to) metal toilet enclosures, prefinished partition systems, acoustic materials, architectural woodwork and casework, elevator entrance doors and frames, elevator equipment, and finished mechanical and electrical equipment including light fixtures, switchgear and distribution cabinets.
 - b. CONCEALED SURFACES: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.
 - c. FINISHED METAL SURFACES: Unless otherwise indicated, metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finished painting.
 - d. OPERATING PARTS: Unless otherwise indicated, moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sensing devices, motor and fan shafts will not require finished painting.
 - e. ALUMINUM metal work is NOT to be field painted.
 5. SHOP PRIMING: Unless otherwise specified, shop priming of ferrous metal items is included under various sections for structural steel, metal fabrications, hollow metal work, and similar items.
 6. Do not paint over any code-required labels, such as Underwriters Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES – NOT USED

1.03 SUBMITTALS

- A. PRODUCT DATA: Submit copies of manufacturer's technical data and installation recommendations.
- B. SAMPLES:
 - 1. Submit samples for Architect-Engineer's review of color and texture only. Provide a listing of material and application for each coat of each finish sample.
 - 2. Provide finish as required on cabinetry mockup, see section 06 40 00, for Architect-Engineer review prior to beginning work.

1.04 QUALITY ASSURANCE

- A. SINGLE SOURCE RESPONSIBILITY: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer and use only within recommended limits.
- B. COORDINATION OF WORK: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information or characteristics of finish materials provided for use, to ensure compatible prime coats are used.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 CLOSE OUT DOCUMENTS AND OWNER'S INSTRUCTIONS AND MAINTENANCE

- A. Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

A. PAINT

- 1. MATERIAL QUALITY: Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying the manufacturer's identification as a standard, best-grade product will not be acceptable.
 - a. COLOR PIGMENTS: Pure, nonfading, applicable types to suit substrates and service indicated.
- 2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Benjamin Moore and Co., Montvale, NJ, www.benjaminmoore.com
 - b. PPG Industries, Pittsburgh Paints, Pittsburgh, PA, www.ppg.com
 - c. Sherwin-Williams, Atlanta, GA, www.sherwin-williams.com

- B. STAIN AND SEALER MANUFACTURERS: Subject to compliance with requirements, provide products of the following or acceptable equivalent:

- 1. Chemprobe, Garland, TX, www.tnemec.com
- 2. DEFT, Cranberry Township, PA, ppgproducts.com
- 3. Minwax, Atlanta, GA, www.sherwin-williams.com

2.02 FINISHES – SEE SCHEDULE

2.03 ACCESSORIES – NOT USED

2.04 FABRICATION – NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

A. REFER TO DIVISION 1 for General Requirements

1. Applicators must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Applicator.
2. Starting painting work will be construed as Applicator's acceptance of surfaces and conditions within any particular area.

3.02 Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film. DELIVERY, STORAGE AND HANDLING

A. DELIVER MATERIALS to job site in original, new and unopened packages and containers bearing manufacturer's name and label, and following information:

1. Name or title of material.
2. Manufacturer's stock number and date of manufacturer.
3. Contents by volume, for major pigment and vehicle constituents.
4. Lead content, if any.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.

B. STORE MATERIALS not in actual use in tightly covered containers. Maintain containers used in storage of paint in a clean condition, free of foreign materials and residue.

1. Protect it from freezing where necessary. Keep the storage area neat and orderly. Remove oily rags and waste daily. Take all precautions to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of paints.

3.03 PREPARATION

A. JOB CONDITIONS

1. APPLY WATER-BASE PAINTS only when temperature of surfaces to be painted and surrounding air temperatures are between 50°F (10°C) and 90°F (32°C), unless otherwise permitted by paint manufacturer's printed instructions.
2. APPLY SOLVENT-THINNED PAINTS only when temperature of surfaces to be painted and surrounding air temperatures are between 45°F (7°C) and 95°F (35°C), unless otherwise permitted by paint manufacturer's printed instructions.
3. DO NOT APPLY PAINT in snow, rain, fog or mist; or when relative humidity exceeds 85%; or to damp or wet surfaces; or when the temperature is within 5° of the dew point, unless otherwise permitted by paint manufacturer's printed instructions.
 - a. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.

B. SURFACE PREPARATIONS

1. GENERAL: Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.
 - a. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify Architect-Engineer in writing of any anticipated problems in using the specified coating systems with substrates primed by others.

- b. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for complete painting of items and adjacent surfaces. Following completion of painting of each space or area, reinstall removed items.
 - c. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program cleaning and painting so that contaminants from the cleaning process will not fall onto wet, newly-painted surfaces.
2. WOOD: Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth and dust off those surfaces to be finished. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.
 3. FERROUS METALS: Clean ferrous surfaces, which are not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.
 4. GALVANIZED SURFACES: Clean free of oil and surface contaminants with non-petroleum-based solvent.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. MATERIALS PREPARATION:
 - a. MIX AND PREPARE painting materials in accordance with manufacturer's directions.
 - b. MAINTAIN CONTAINERS used in mixing and application of paint in a clean condition, free of foreign materials and residue.
 - c. STIR MATERIALS before application to produce a mixture of uniform density and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
2. APPLICATION:
 - a. GENERAL: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
 - i. Apply additional coats when undercoats, stains or other conditions show through final coat of paint, until paint film is of uniform finish, color and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 - ii. Provide pinhole free installation at all wet areas.
 - iii. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only before final installation of equipment.
 - iv. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
 - v. Paint the back sides of access panels, and removable or hinged covers to match exposed surfaces.
 - vi. Finish exterior doors on tops, bottoms and side edges same as exterior faces, unless otherwise indicated.
 - vii. Sand lightly between each succeeding enamel or varnish coat.
 - viii. Omit first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.
 - b. SCHEDULING PAINTING: Apply first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

- i. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
- c. **MINIMUM COATING THICKNESS:** Apply materials at not less than manufacturer's recommended spreading rate, to establish a total dry film thickness scheduled or, if not indicated, as recommended by coating manufacturer.
- d. **PRIME COATS:** Apply prime coat of material, which is required to be painted or finished, and which has not been prime coated by others.
Recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.
- e. **PIGMENTED (OPAQUE) FINISHES:** Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.
- f. **COMPLETED WORK:** Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.
- g. **CODE REQUIRED MARKING:** Smoke barriers and fire rated walls identified on the Life Safety plans shall be effectively and permanently identified with painted stenciling in a manner acceptable to the authority having jurisdiction. Such identification shall be above any decorative ceiling and in concealed spaces. Text shall read "FIRE AND SMOKE BARRIER PROTECT ALL OPENINGS" Color shall contrast the color of the surface to which it is applied and in locations where it is clearly distinguishable.

3.05 FIELD QUALITY CONTROL

- A. The right is reserved by Owner to invoke the following material testing procedure at any time, and any number of times during period of field painting:
 - 1. Engage services of an independent testing laboratory to sample paint being used. Samples of materials delivered to the project site will be taken, identified and sealed, and certified in presence of Contractor.
 - 2. Testing laboratory will perform appropriate tests for any or all of following characteristics: Abrasion resistance, apparent reflectivity, flexibility, wash ability, absorption, accelerated weathering, dry opacity, accelerated yellowness, recoating, skinning, color retention, alkali resistance and quantitative materials analysis.
- B. If test results show that material being used does not comply with specified requirements, Contractor may be directed to stop painting work, and remove noncomplying paint; pay for testing; repaint surfaces coated with specified paint.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. **CLEAN-UP:** During the progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of each workday.
- B. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch otherwise damage finished surfaces.
- C. **PROTECTION:** Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect-Engineer.
- D. Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrapping provided by others for protection of their work, after completion of painting operations.
- E. At completion of work of other trades, touch-up and restore all damaged or defaced surfaces.

PART 4 SCHEDULES

4.01 EXTERIOR PAINT SCHEDULE:

- A. GENERAL: Provide following paint systems for the various substrates, as indicated. The manufacturer listed is Benjamin Moore for standard of quality required Except for where PPG products are specified. An equal product by a manufacturer listed in this section is acceptable.

Application	Coat	Product	No.	DFT (mils)
FERROUS METAL: (FACTORY PRIMED) Includes all doors, frames, trim and other ferrous metal items with factory primer	P	Super Spec HP Akyd Metal Primer	P-06	1.7 – 2.1
	1	Ultra-Spec HP D.T.M. Acrylic Semi-Gloss Enamel	HP29	2.3
	2	Ultra-Spec HP D.T.M. Acrylic Semi-Gloss Enamel	H29	2.3
GYPSUM BOARD: Board to be utilized at underside of canopies as shown	P	Regal Select - Moorgard Low Lustre Finish	W103	2.0
	1	Ultra-Spec HP D.T.M. Acrylic Semi-Gloss Enamel	HP29	2.3
	2	Ultra-Spec HP D.T.M. Acrylic Semi-Gloss Enamel	HP29	2.3

- B. Provide Inspections by the manufacturer at each phase of the exterior masonry painting: prior to beginning, after block filler, after first coat and then final. Follow manufacturer written inspection requirements. Copies of inspection report to be provided to construction manager.

- C. Provide a five-year written warranty to the owner for material and product defects.

4.02 INTERIOR PAINT SCHEDULE:

- A. GENERAL: Provide the following paint systems for the various substrates, as indicated. The manufacturer listed is Benjamin Moore for standard of quality required. An equal product by a manufacturer listed in this section is acceptable.

Application	Coat	Product	No.	DFT (mils)
FERROUS METAL: (FACTORY PRIMED) Includes all frames, trim and other ferrous metal items with factory primer	P	Acrylic Metal Primer	V110	1.4 – 1.9
	1	Acrylic DTM Enamel Gloss	V330	1.9 – 2.3
	2	Acrylic DTM Enamel Gloss	V330	1.9 – 2.3
FERROUS METAL: (NOT FACTORY PRIMED) Includes all misc. steel items without factory primer or finish.	P	Prep All Universal Metal Primer	V132	1.8 - 2.3
	1	Ultra-Spec 500 Interior Low Sheen	N537	1.8
	2	Ultra-Spec 500 Interior Low Sheen	N537	1.8
GYPSUM DRYWALL	P	Eco Spec WB Primer	N372	1.2
	1	Eco Spec WB Semi-Gloss	N376	1.5 – 1.9
	2	Eco Spec WB Semi-Gloss	N376	1.5 – 1.9
WOOD – STAIN: Includes all doors, frames, trim and wood wall panels	P	Deft Water Based Wood Stain	DFT300	1.1
	1	Deft Clear Polyurethane Acrylic Satin	DFT159	0.9 - 1.1
	2	Deft Clear Polyurethane Acrylic Satin	DFT159	0.9 – 1.1

END OF SECTION

DIVISION - 10 SPECIALTIES

10 14 00 SIGNS

10 21 13 TOILET PARTITIONS

10 28 13 TOILET ACCESSORIES

10 44 00 FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. GENERAL DESCRIPTION:

1. Signs refer to interior signs as shown on the documents and schedules.
2. The Owner will be responsible to provide and install appropriate signage as required by the Americans with Disabilities Act for items not installed under this contract.

B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

A. Americans with Disabilities Act Accessibility Guidelines (ADAAG)

1.03 SUBMITTALS

A. PRODUCT DATA: Submit manufacturer's technical data and installation instructions for each type of sign required.

B. SAMPLES: Submit full-size sample units. Acceptable units may be installed as part of the work.

C. COLOR: Submit original manufacturer color charts, electronic versions are not acceptable.

1.04 QUALITY ASSURANCE

A. UNIFORMITY OF MANUFACTURER: For each sign form and graphic image process indicated furnish products of a single manufacturer.

1.05 SYSTEM DESCRIPTION

A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

A. PLAQUE SIGNS:

1. SIGN MATERIALS

- a. Face: Tactile letters
- b. Backing Plate: Acrylic

2. FABRICATION OPTIONS

- a. Tactile Graphics and Text: Fabrication process: Provide tactile copy and grade 2 Braille where indicated raised 1/32 inch minimum from plaque first surface by manufacturer's photopolymer bonded process. Sign face of single material, tactile characters and Braille integral to photopolymer. Adhesive-fixed characters are not acceptable.
- b. Provide lettering and graphics precisely formed, uniformly opaque to comply with relevant ADA regulations and requirements indicated for size, style, spacing, content, position, and colors. Tactile characters to be raised min. 1/32" from surface. Computerized translation of sign copy to be responsibility of the manufacturer.
- c. Mounting Panel Options:
 - i. Size:

Type Overall Dimension

A 9" High X 6" Wide

- ii. Thickness: .125-inch-thick matte finished acrylic.
- iii. Background Appearance Options: Solid color: Select from manufacturer's standard range.
- iv. Tactile Lettering and Graphics Color Options: White
- v. Shape: Rectangular
- vi. Letter style and layout position: Specify from manufacturer's standard letter styles and color charts.

3. INSTALLATION METHOD

a. System SA, silicone adhesive.

4. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:

- a. APCO Graphics, Inc., Atlanta, GA, www.apcosigns.com
- b. A.R.K. Ramos, Oklahoma City, OK, www.arkramos.com
- c. ASI Sign Systems, Inc., Dallas, TX, <https://asisignage.com/>
- d. Best Sign Systems, Montrose, CO, www.bestsigns.com
- e. Sign Maters, Inc., Collierville, TN, www.signmattersinc.com

2.02 FINISHES – see section 2.01

2.03 ACCESSORIES – NOT USED

2.04 FABRICATION

- A. General: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
- B. Preassemble signs in the shop to the greatest extent possible to minimize field assembly. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in a location not exposed to view after final assembly.
- C. Conceal fasteners if possible; otherwise, locate fasteners to appear inconspicuous.
- D. Form panels to required size and shape. Comply with requirements indicated for design, dimensions, finish, color, and details of construction.
- E. Coordinate dimensions and attachment methods to produce message panels with closely fitting joints. Align edges and surfaces with one another in the relationship indicated.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements
- B. Site Verification of Conditions: Verify installation conditions previously established under other sections are acceptable for product installation in accordance with manufacturer's instructions.
- C. Scheduling of installation by Owner or its representative implies that substrate and conditions are prepared and ready for product installation. Proceeding with installation implies installer's acceptance of substrate and conditions.

3.02 DELIVERY, STORAGE AND HANDLING

- A. DELIVER SIGNS AND LETTERS to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage.

3.03 PREPARATION – NOT USED

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. Install product in accordance with supplier's instructions.
2. Install product in locations indicated using mounting methods recommended by sign manufacturer and free from distortion, warp, or defect adversely affecting appearance.
3. Install product level, plumb, and at heights indicated.
4. Install product at heights to conform to Americans with Disabilities Act Accessibility Guidelines (ADAAG) and applicable local amendments and regulations.
5. Install signs within the following tolerances and in accordance with manufacturer's recommendations:
6. Interior Signs: Within 1/4 inch vertically and horizontally of intended location.

3.05 FIELD QUALITY CONTROL – NOT USED

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. Repair scratches and other damage which might have occurred during installation. Replace components where repairs were made but are still visible to the unaided eye from a distance of 5 feet.
- B. Remove temporary coverings and protection to adjacent work areas. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project in accordance with provisions in Division 1.

PART 4 SCHEDULES

4.01 INTERIOR SIGN SCHEDULE

- A. Schedule: Refer to signage schedule and Drawings for sizes, locations, and layout of signage types, sign text copy, and graphics.

Door Number	Sign	Mount	Sign Copy	Remarks
	Type	Config		
101	A		WOMEN	Accessibility Symbol
102	A		MEN	Accessibility Symbol
113	A		UNISEX	Accessibility Symbol
116	A		UNISEX	

Note:

1. All plaque signs shall be mounted on the wall adjacent to the strike side of the door mounted at 60 inches above the floor to the centerline.
2. All room identification signs other than painted graphics and regulatory required signs are NOT included in the contract.

4.02 EXTERIOR SIGN SCHEDULE

- A. Provide cast metal letters as shown on the Exterior Sign Details on the Construction Drawings.

END OF SECTION

TOILET PARTITIONS 10 21 13

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Solid phenolic, overhead braced toilet partitions, including panels, doors, and pilasters, with the appropriate hardware and structural accessories as identified in the documents.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES – NOT USED

1.03 SUBMITTALS

- A. PRODUCT DATA: Submit manufacturer's detailed technical data for materials, fabrication, and installation, including catalog cuts of anchors, hardware, fastenings, accessories, and full range of color samples.
- B. SHOP DRAWINGS: Submit shop drawings indicating partition layouts, swing of doors, elevations and all relevant dimensions.

1.04 QUALITY ASSURANCE

- A. Components of toilet partitions shall be sourced from one single source manufacturer who certifies that materials meet or exceed specifications.
- B. FIELD MEASUREMENTS: Take field measurements prior to preparation of shop drawings and fabrication where possible, to insure proper fitting of work. However, allow for adjustments within specified tolerations wherever taking of field measurements before fabrication might delay work.
- C. COORDINATION: Furnish inserts and anchorages which must be built into other work for installation of toilet partitions and screens.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

A. GENERAL:

- 1. Provide materials which have been selected for surface flatness and smoothness, exposed surfaces which exhibit pitting, seam makers, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are not acceptable.

B. SOLID PHENOLIC:

- 1. Solid Phenolic Material: Composed of melamine-impregnated decorative surface papers superimposed over varying number of Kraft phenolic core sheets to achieve a desired thickness and a water-resistant surface. The edges shall be machined with a consistent polished grained finish. All sharp edges to be removed. Material has a standard Class "B" Flame Spread rating.
- 2. PHENOLIC CORE FINISH:
 - a. Manufacturer's standard impregnated, with one color in each room.
 - b. Color: As selected by Architect from manufacturer's full line.

3. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Bradley Corporation
 - b. Bobrick Washroom Equipment
 - c. Capital Partitions

2.02 ACCESSORIES

- A. PILASTER SHOES: ASTM 01.03, Type 302/304 stainless steel, not less than 4" high and 20 gage, finished to match hardware. Shoe shall be secured by Phillips head screws.
- B. STIRRUP BRACKETS:
 1. Manufacturer's standard design for attaching panels to walls and pilasters, either chromium-plated nonferrous cast alloy ("Zamac") or anodized aluminum and be provided at the appropriate locations.
- C. HARDWARE AND ACCESSORIES:
 1. Manufacturer's standard design, heavy-duty operating hardware and accessories of chromium-plated nonferrous cast alloy ("Zamac").
 - a. Hinges shall wraparound and be thru-bolted to the pilasters and shall have true gravity cams. The closing position of each hinge shall be fully adjustable.
 - b. Surface-mounted slide latch shall provide emergency egress, shall not require any twisting motion and shall be ADA compliant.
 - c. Strike and keeper to be provided as surface mounted.
 - d. Coat hook and wall bumper shall be provided for in-swing doors. Door pulls shall be added for out-swing doors.
 - e. Fastener for hinges, slide latch and keeper shall be zinc-plated with theft-resistant heads
- D. OVERHEAD BRACING:
 1. Continuous extruded aluminum tubing in anti-grip profile, with clear anodized finish.
- E. ANCHORAGES AND FASTENERS:
 1. Manufacturer's standard exposed fasteners of stainless steel, chromium plated steel, or brass finished to match hardware, with theft-resistant type heads and nuts. For concealed anchors, use hot-dip galvanized, cadmium-plated, or other rust-resistant protective-coated steel.

2.03 FABRICATION

- A. GENERAL: Furnish standard doors, panels, screens, and pilasters fabricated for partition system, unless otherwise indicated. Furnish units with cutouts, drilled holes, and internal reinforcement to receive partition-mounted hardware, accessories, and grab bars as indicated.
- B. DOOR DIMENSIONS: Unless otherwise indicated, furnish 24" wide in-swinging doors for ordinary toilet stalls and 32" wide (clear opening) out-swinging doors at stalls equipped for use by handicapped.
- C. PLASTIC LAMINATE PARTITIONS: Pressure-laminate one-piece face sheets to core material with no splices or joints, and with edges straight and sealed. Seal exposed core material at cutouts to protect against moisture.
- D. OVERHEAD-BRACED PARTITIONS: Furnish galvanized steel supports and leveling bolts at pilasters, as recommended by manufacturer to suit floor conditions. Make provisions for setting and securing continuous aluminum overhead bracing tube at top of each pilaster. Furnish shoe at each pilaster to conceal supports and leveling mechanism.
- E. HARDWARE: Furnish hardware for each compartment in partition system, as follows:

1. HINGES: Cutout inset type, adjustable to hold door open at any angle up to 90°. Provide gravity type, spring action cam type, or concealed torsion rod type, to suit manufacturer's standards.
2. LATCH AND KEEPER: Manufacturer's standard surface-mounted latch unit, designed for emergency access, with combination rubber-faced door strike and keeper.
3. COAT HOOK: Manufacturer's standard unit, combination hook and rubber-tipped bumper.
4. DOOR PULL: Manufacturer's standard unit.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING

- A. DELIVER TOILET PARTITIONS to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage.

3.03 PREPARATION

- A. JOB CONDITIONS: Examine areas to receive toilet compartments for correct height and spacing of anchorage/blocking and plumbing fixtures that may affect installation of compartments. Report any discrepancies to the architect.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. GENERAL: Comply with manufacturer's recommended procedures and installation sequence. Install partitions rigid, straight, plumb, and level. Provide clearances of not more than 1/2" between pilasters and panels, and not more than 1" between panels and walls. Secure panels to walls with not less than two stirrup brackets attached near top and bottom of panel. Locate wall brackets so that holes for wall anchorages occur in masonry or tile joints. Secure panels to pilasters with not less than two stirrup brackets located to align with stirrup brackets at wall. Secure panels in position with manufacturer's recommended anchoring devices.
2. Panels and Pilasters:
 - a. Support panels, except urinal screens, and pilaster abutting building walls near top and bottom by stirrup supports secured to partitions with through-bolts.
 - b. Secure stirrups to walls with two suitable anchoring devices for each stirrup.
 - c. Secure panels to faces of pilaster near top and bottom with stirrup supports, through-bolted to panels and machine screwed to each pilaster.
 - d. Secure edges of panels to edges of pilasters near top and bottom with "U" shaped brackets.
 - e. Where overhead braced, secure pilasters to building walls by headrails clamped on or set into top of each pilaster.
 - i. Secure clamps to pilasters with two through-bolts to each clamp.
 - ii. When headrails are set into pilasters, through-bolt them to the pilasters.
 - iii. Support headrails on wall flange fittings secured to building walls with minimum of two anchor bolts to each flange fitting.
3. Urinal Screens:
 - a. Anchor urinal screen flange to walls with concealed anchoring devices, as recommended by manufacturer to suit supporting wall structure. Set units to provide support and to resist lateral impact.
 - b. Space anchors at top and bottom and equally in between.

4. ACCESSORIES: Mount accessories to partition units in accordance with manufacturer's instructions.

B. COORDINATION WITH OTHER WORK

1. Examine areas to receive toilet compartments for correct height and spacing of anchorage/blocking and plumbing fixtures that may affect installation of compartments. Report any discrepancies to the architect.

3.05 FIELD QUALITY CONTROL – NOT USED

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. HARDWARE ADJUSTMENT: Adjust and lubricate hardware for proper operation. Set hinges on in-swinging doors to hold open approximately 30° from closed position when unlatched. Set hinges on out-swinging doors to return to fully closed position.
- B. CLEAN exposed surfaces of partition systems using materials and methods recommended by manufacturer, and provide protection as necessary to prevent damage during remainder of construction period.

PART 4 SCHEDULES – NOT USED

END OF SECTION

TOILET ACCESSORIES 10 28 13

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Types of toilet accessories required include the following:
 - 1. Paper towel dispensers.
 - 2. Framed Mirrors.
 - 3. Grab Bars.
 - 4. Liquid Soap Dispensers.
 - 5. Toilet Tissue Dispensers.
 - 6. Sanitary Napkin Dispensers.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. ASTM A123 / A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; latest edition.
- B. American Iron and Steel Institute

1.03 SUBMITTALS

- A. PRODUCT DATA: Submit manufacturer's technical data and installation instructions for each toilet accessory.
- B. SHOP DRAWINGS: Provide setting drawings, templates, instructions, and directions for installation of anchorage devices in other work.

1.04 QUALITY ASSURANCE

- A. ACCESSORY LOCATIONS: Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of accessory units.
- B. PRODUCTS: Provide products of same manufacturer for all accessories.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS:

2.01 MATERIALS: Fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless-steel piano hinge. Provide concealed anchorage.

- A. PAPER TOWEL DISPENSERS (Mark T1):
 - 1. (Bob) B-262
- B. MIRROR WITH STAINLESS STEEL FRAME (Mark T2): 18 inches wide X 36 inches high with tempered glass mirror:
 - 1. (Bob) B-165
- C. GRAB BARS (Mark T3): 1-1/2" clearance, peened grip, stainless steel. At each handicapped toilet. (Bob) B 5806 Series.

1. (Mark T-3a) x 36
 2. (Mark T-3b) x 42
 3. (Mark T-3c) x 18
- D. LIQUID SOAP DISPENSER (Mark T4):
1. (Bob) B-4112
- E. TOILET TISSUE DISPENSER (Mark T5): Dual wall unit; one at each water closet.
1. (Bob) B-2888
- F. NAPKIN DISPOSAL (PARTITION/ SURFACE MOUNTED) (Mark T6):
1. (Bob) B-354
- G. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
1. Bobrick Washroom Equip., Inc., www.bobrick.com, (Bob)
 2. Bradley Corp., www.bradleycorp.com, (Brad)
 3. A & J Washroom Accessories, New Windsor, NY, www.ajwashroom.com, (A&J)
 4. American Specialties, Yonkers, NY, www.americanspecialties.com
 5. Northwest Specialty Hardware, www.northwestsh.com (NW)
 6. Willoughby, www.willoughby.com
- 2.02 FINISHES
- A. STAINLESS STEEL: AISI Type 302/304, with polished No. 4 finish, 22 gage minimum, unless otherwise indicated.
 - B. GALVANIZED STEEL MOUNTING DEVICES: ASTM A123 / A123M, hot dip galvanized after fabrication.
 - C. FASTENERS: Manufacturer's standards with unit's accessory.
- 2.03 ACCESSORIES – NOT USED
- 2.04 FABRICATION
- A. GENERAL: Stamped names or labels on exposed faces of toilet accessory units are not permitted; inobtrusive labels on surfaces not exposed to view are acceptable. Where locks are required for a particular type of toilet accessory, provide same keying throughout project. Furnish two keys for each lock.

PART 3 EXECUTION

- 3.01 EXAMINATION OF SITE
- A. REFER TO DIVISION 1 for General Requirements
- 3.02 DELIVERY, STORAGE AND HANDLING
- A. DELIVER ACCESSORIES to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage.
- 3.03 PREPARATION – NOT USED
- 3.04 CONSTRUCTION
- A. CONSTRUCTION / INSTALLATION

1. Install toilet accessory units in accordance with manufacturers' instructions, using fasteners which are appropriate to substrate and recommended by manufacturer of unit. Install units plumb and level, firmly anchored in locations indicated.
2. Mounting Heights for each accessory shall be as shown on the Project Drawings.
3. In any and all installation of toilet accessories in inmate areas, utilize security torx screws in lieu of standard screws.

3.05 FIELD QUALITY CONTROL – NOT USED

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

ADJUST toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.

CLEAN and polish all exposed surfaces after removing protective coatings.

PART 4 SCHEDULES

4.01 TOILET ACCESSORIES SCHEDULE:

Room	T1	T2	T3a	T3b	T3c	T4	T5	T6
WOMEN'S TLT 101		Note 3	Note 2	Note 2	Note 2		Note 1	Note 1
MEN'S TLT 102		Note 3				Note 4	Note 1	
TOILET 113		Note 3					Note 1	
TOILET 116		Note 3					Note 1	

NOTES:

- 1 Provide one for each water-closet.
- 2 Provide grab bars at accessible water-closet only.
- 3 Framed mirror to be centered over lavatory at specified height.
- 4 Provide one for each lavatory.

END OF SECTION

FIRE EXTINGUISHERS, CABINETS, AND ACCESSORIES 10 44 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: "Fire extinguishers" in this section refers to units which can be hand-carried as opposed to those which are equipped with wheels or to fixed fire extinguishing systems, unless otherwise indicated. This will include fire extinguishers and fire extinguisher cabinets.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. National Fire Protection Association (NFPA) 10 – Standard for Portable Fire Extinguishers; latest edition.
- B. Titles 8, 19, and 24, California Code of Regulations (CCR); latest edition.
- C. Underwriters Laboratories, Inc. (UL) – Rating and Fire Testing of Fire Extinguishers; latest edition.

1.03 SUBMITTALS

- A. PRODUCT DATA: Submit manufacturer's technical data and installation instructions for all portable fire extinguishers required. For fire extinguisher cabinets include roughing-in dimensions, and details showing mounting methods, relationships to surrounding construction, door hardware, cabinet type and materials, trim style and door construction, style materials. Where color selections by Architect-Engineer is required include color charts showing full range of manufacturer's standard colors and designs available.

1.04 QUALITY ASSURANCE

- A. Provide portable fire extinguishers, cabinets and accessories by one manufacturer, unless otherwise acceptable to Architect-Engineer.
- B. UL-LISTED PRODUCTS: Provide new portable fire extinguishers which are UL-listed and bear UL "Listing Mark" for type, rating, and classification of extinguisher indicated.
- C. FM LISTED PRODUCTS: Provide new portable fire extinguishers which are approved by Factory Mutual Research Corporation for type, rating, and classification of extinguisher indicated and carry appropriate FM marking.
- D. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers"

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS / EQUIPMENT

- A. FIRE EXTINGUISHERS:
 - 1. GENERAL: Provide fire extinguishers for each extinguisher cabinet and other locations indicated, in colors and finishes selected by Architect-Engineer from manufacturer's standard which comply with requirements of governing authorities. ABBREVIATIONS

indicated below to identify extinguisher types related to UL classification and ratings system and not, necessarily, to type and amount of extinguishing material contained in extinguisher.

- a. MULTI-PURPOSE DRY CHEMICAL TYPE (4A-60BC-FE): UL-rated 4-A:60-B: C, 10lb. nominal capacity, in enameled steel container, for Class A, Class B, and Class C fires. Provide at all locations other than type indicated below. Provide in cabinet as indicated on the drawings.
 2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. J.L. Industries, Bloomington, MN, www.jlindustries.com
 - b. Larsen's Mfg. Co., Minneapolis, MN, www.larsensmfg.com
 - c. Potter-Roemer, Los Angeles, CA, www.potterroemer.com
- B. FIRE EXTINGUISHER CABINETS:
1. GENERAL: Provide fire extinguisher cabinets (FEC) where indicated, of suitable size for housing fire extinguishers of types and capacities indicated.
 2. CONSTRUCTION: Manufacturer's standard enameled steel box, with trim, frame, door and hardware to suit cabinet type, trim style, and door style indicated. Weld all joints and grind smooth. Miter and weld perimeter door frames.
 3. CABINET TYPE:
 - a. SEMI-RECESSED: Provide a cabinet box (tub) partially recessed in all metal stud walls unless otherwise noted. In no case shall the protruding portion of the cabinet extend more than 4 inches into the corridor travel path.
 - b. SURFACE MOUNTED: Cabinet box to be mounted on concrete and concrete masonry where indicated on the drawings.
 4. TRIM STYLE: Fabricate trim in one piece with corners mitered, welded and ground smooth:
 - a. DEPTH 4"
 - b. TRIM METAL: Of same metal as door.
 5. DOOR MATERIAL AND CONSTRUCTION: Manufacturer's standard enameled steel door construction coordinated with cabinet types and trim styles selected, hollow steel door construction with tubular stiles and rails.
 6. DOOR STYLE: Manufacturer's standard solid panel with red silk screen lettering spelling "FIRE EXTINGUISHER" vertically on the face of door.
 7. DOOR HARDWARE: Provide manufacturer's standard door operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide a lever handle with cam action latch, concealed, and friction latch. Provide a concealed or continuous type hinge permitting door to open 180°.
 8. MANUFACTURERS: Refer to Materials 2.01, A.2 for Manufacturers.

2.02 FINISHES (FACTORY):

- A. FIRE EXTINGUISHER CABINETS:
1. GENERAL: Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations except as otherwise indicated. Apply finishes in factory after products are assembled. Protect cabinets with plastic or paper covering, prior to shipment.
 - a. BAKED ENAMEL FINISH: Immediately after cleaning and pretreatment, apply manufacturer's standard baked enamel coating, provide colors or color as selected by Architect-Engineer from manufacturer's standard colors.

2.03 ACCESSORIES – NOT USED

2.04 FABRICATION – NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING – Do not deliver until building is enclosed and ready for installation. Protect from damage during delivery, handling, storage, and installation.

3.03 PREPARATION – NOT USED

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. INSTALL ITEMS included in this section in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulations of governing authorities.

a. SECURELY FASTEN mounting brackets and fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions.

B. COORDINATION WITH OTHER WORK

1. PREPARE RECESSES in walls for fire extinguisher cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.

3.05 FIELD QUALITY CONTROL – NOT USED

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

A. Adjust cabinet doors that do not swing or operate freely.

B. Refinish or replace cabinets and doors damaged during installation.

C. Provide final protection and maintain conditions that ensure that cabinets and doors are without damage or deterioration at the time of Substantial Completion.

PART 4 SCHEDULES – NOT USED

END OF SECTION

DIVISION - 12 FURNISHINGS

12 36 61 SOLID SURFACING COUNTERTOP

12 67 00 COURTROOM PEWS

END OF SECTION

SOLID SURFACING COUNTERTOPS 12 36 61

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Provide countertops as defined in the drawings.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.
- C. RELATED SECTIONS
 - 1. Section 06 40 00 – Architectural Millwork

1.02 SUBMITTALS

- A. PRODUCT DATA: Submit manufacturer's product data for each product and process specified as work of this section and incorporated into items of architectural woodwork during fabrication, finishing, and installation.
 - 1. Product Data: For adhesives and sealants, indicating VOC content.
 - 2. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.
- B. SHOP DRAWINGS: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, terminations, and cutouts.
 - 1. Show locations and details of joints.
 - 2. Show direction of directional pattern, if any.
- C. SAMPLES:
 - 1. Samples for Initial Selection: For each type of material exposed to view, 6 inches (150 mm) square.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: ISO 9001 quality management system certification for manufacturing facility.
- B. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.
- C. Manufacturer-certified fabricator.
- D. Installer Qualifications: Manufacturer certified fabricator of countertops.
- E. Coordinate locations of utilities that will penetrate countertops or backsplashes.

1.04 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and installer agree to repair or replace sheet material not free from defects in materials, fabrication, or workmanship within specified warranty period.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

1.05 QUALITY ASSURANCE

- A. QUALIFICATIONS
 - 1. INSTALLER QUALIFICATIONS: For warranty coverage, fabricator/installer shall be approved by solid polymer manufacturer.

2. ALLOWABLE TOLERANCES

- a. Variation in component size: $\pm 1/8"$ (3 mm).
- b. Location of openings: $\pm 1/8"$ (3 mm) from indicated location.

1.06 SYSTEM DESCRIPTION

A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.07 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

A. SOLID SURFACE COUNTERTOP AND WALL MATERIALS

1. Composition Solid-Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
2. Basis-of-Design Product: Subject to compliance with requirements, provide Wilsonart LLC or a comparable product by one of the following:
 - a. DuPont Corian
 - b. Durasein
 - c. Wilsonart
 - d. Formica Corp.
3. Thickness: 0.490 inch (12.4 mm).

2.02 FINISHES

- A. COLORS AND PATTERNS: As selected by Architect-Engineer from manufacturers' standard products.
- B. FINISHES: All surfaces shall have uniform finish.

2.03 ACCESSORIES

- A. JOINT ADHESIVE: Product recommended by solid surface material manufacturer.
 1. Adhesives shall have a VOC content of 70g/L or less.
 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
 3. Sealant for Countertops: Comply with applicable requirements in Section 07 91 00 "Joint Sealers."

2.04 FABRICATION

- A. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and solid polymer manufacturer requirements.
- B. Provide holes and cutouts for plumbing and bath accessories as indicated on the drawings.
- C. Rout and finish component edges to a smooth, uniform finish. Rout all cutouts, then sand all edges smooth. Repair or reject defective or inaccurate work.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

- B. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

3.02 DELIVERY, STORAGE AND HANDLING

- A. DO NOT DELIVER components to project site until areas are ready for installation. Store components indoors prior to installation.
- B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

3.03 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

- 1. INSTALL components plumb and level, in accordance with approved shop drawings and product installation details.
- 2. FORM field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work. Keep components and hands clean when making joints.
- 3. ADHERE under mount sinks/bowls to countertops using manufacturer recommended adhesives and color-matched silicone sealant.
- 4. Provide backsplashes and endsplashes as indicated on the drawings. Adhere to countertops using manufacturer's standard color-matched silicone sealant.
- 5. Keep components and hands clean during installation. Remove adhesives, sealants and other stains. Components shall be clean on Date of Substantial Completion.
- 6. Fabricator/Installer is to provide a commercial care and maintenance video, review maintenance procedures and warranty details with the director of maintenance upon completion of project.

B. COORDINATION WITH OTHER WORK

- 1. Bore cable holes and provide grommets where below desktop electrical, data and telephone outlets occur. Provide openings as required for the routing of conduits, raceways and other equipment provisions are necessary. Provide cutouts as necessary for plumbing and lavatory bowls where indicated. Coordinate with the work of all other trades in the fabrication and installation of all cabinets, counters and built-in desktops.

3.04 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. REPAIR DAMAGED and defective materials where possible to eliminate defects functionally and visually; where not possible to repair/replace.
 - 1. Keep components and hands clean during installation. Remove adhesives, sealants and other stains. Components shall be clean on Date of Substantial Completion. Protect surfaces from damage until Date of Substantial Completion.
 - 2. Repair or replace damaged work that cannot be repaired to architect's satisfaction and invoice for the cost of repairs. Architect to pre-approve cost estimate before repairs are started.

END OF SECTION

COURTROOM PEW SEATING 12 67 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Furnish and install the pews for both courtrooms.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES – Not Used

1.03 SUBMITTALS

- A. PRODUCT DATA
- B. SHOP DRAWINGS: Provide drawings showing dimensional information about pews.
- C. SAMPLES:
 - 1. Provide 4" x 4" samples so stain color can be selected to match other stained materials.

1.04 QUALITY ASSURANCE

- A. Installation: All benches will be installed by factory-trained personnel with a minimum of 10 years of experience in this type of installation. All installations must be under the direct supervision of the manufacturer's local representative. All benches will be placed, scribed, and anchored in locations indicated on the submittal drawings. The manufacturer will submit a certificate of insurance covering all installers at the job site.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE—For the general requirements for contract close-out, Refer to Section 01 77 00.

PART 2 PRODUCTS

2.01 MATERIALS

- A. BACKS: All bench backs are to be constructed of solid red oak with wood grains running longitudinally. All red oak material used must be of hand select quality, free from blemishes, with 99% knothole clarity. All backs are to be edge glued using tongue and groove joining. Each of the tongue and groove joints receives a minimum of 5/8" penetration at the joint and continued the entire length of the edge. All glued parts must be allowed a minimum of 24 hours to dry. The Finished thickness of the backs is to be 7/8" (nominal dimension). Top of backs to have a heavy molded cap rail with a bed mold of not less than 1/2" in thickness. Cap and molding are attached with hot glue and blind nails to ensure a very tight fit. Backs are to have a finished width of 20-13/16" and have a 5-7/8" pitch. All parts attaching to backs shall be joined with screws and concealed with wooden screw molding.
- B. SEATS: All bench seats to be constructed of solid red oak wood with grains running in the same direction as bench backs (longitudinally). All red oak material used must be of hand select quality, free from blemishes, with 99% knothole clarity. All seats are glued to the edge using tongue and groove jointing. Each tongue and groove joint receives a minimum of 24 hours to dry. The finish thickness of the seats is to be 1-1/2" (nominal dimension), the width to be 15-1/4", and to have a 2-3/8" pitch. Front lips receive a heavy wood nosing attached with hot melt glue and blind nails. Seats are to be secured to the backs with crews every 8" and are to be covered with red oak screw molding.

- C. BENCH ENDS: Benches to have ends. Each end shall be constructed of 3-ply solid red oak. All edge glued parts of ends have tongue and groove joints. These joints are a minimum of 2" apart. All other pieces are to be face glued construction. All 3 ply ends are to be a minimum of 2-1/4" in thickness. Minimum size of ends to be 2'-0" high and 1'-10" in width. All connections into the ends must be made with routed joints supported with 3 screws at the seat and back. The end style and shape are similar to Sauder 302-2200M cantilevered ends.
 - D. BENCH BACK AND SEAT SUPPORTS: All bench back and seat supports must be constructed from solid red oak wood. The supports shall be a minimum of 2'-6" high, 1'-5" wide, and 1-1/2" thick. All supports are to be 2-ply face glued construction. All supports are to be shaped and finished on all visible edges. All edge-glued joints in the supports should be tongue and groove construction with a minimum of 2" between joints. Supports are to be cut long at the factory and scribed to fit the floor at the job site. Supports are to be designed with a taper on the front of the support and straight on the back of the support. The support will extend to just under the back of the cap rail on the back for maximum strength and stability. Each support will have two screws attaching supports to the seats. The longest span between supports is 4'8" and 6" from end-to-end support.
 - E. BENCH DIVISIONS: All benches long enough to require divisions shall be furnished with concealed-type divisions. Such divisions should be clearly shown on the submitted field-measured seating plan. The bottom side of the bench will receive 3 tight joint fasteners at the division to ensure a smooth and tight connection from seat to seat. The backside of the backs receives 3 tight joint fasteners concealed with an added face board and a regular back and seat support on top of the face board. All joints should fit snugly from seat to seat and from back to back. All back and seat support at the division location should be anchored in the same manner as the end supports are anchored.
 - F. MANUFACTURER: The basis of design is Sauder Courtroom Furniture. Subject to compliance with requirements, provide products of one of the following or equivalent:
 - 1. Imperial Woodworks
 - 2. Ratigan-Schottler
 - 3. Sauder Courtroom Furniture
- 2.02 FINISHES: All wood is to be finished with oil stain containing wood filler, applied in one coat by hand and allowed to dry at least 10 minutes, then wiped with burlap across the grain, then finished with soft finish rags rubbed with the grain. Sanding sealer of 21% solid content is to be sprayed on and allowed to dry for at least six hours in a humidity-controlled climate. The sealer is then sanded with 6/0 sandpaper and finished with soft lint-free rags before any topcoat can be applied. The topcoat is a three-level coat of pre-catalyzed lacquer with a minimum of 32% solid content. The third coat is allowed to dry a minimum of 24 hours before it can be moved. All stain and finish brands are to be submitted prior to final approval.
- 2.03 ACCESSORIES
- A. BENCH ANCHORS: All benches will receive a minimum of two anchor bolts per end. Anchoring will be concealed on the inside of the ends. No "angle iron" or "L" bracket anchors will be permitted. All in-floor anchor studs must be a minimum of 1/4" diameter and solid steel construction. No aluminum anchor studs will be accepted. All division supports will also receive two anchors.
- 2.04 FABRICATION
- A. Fabrication: See descriptions above.
 - B. Field Measurements: The manufacturer is responsible for making a site visit to verify all measurements before manufacturing the benches. Failure to make a visit does not relieve the manufacturer from this responsibility.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING – Not Used

3.03 PREPARATION – Not Used

3.04 CONSTRUCTION – Not Used

3.05 FIELD QUALITY CONTROL: All benches to be installed straight, level, plumb and true.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

A. Cleaning: all trash, packing materials, material scraps and other debris related to the work shall be removed from the job site prior to project completion.

PART 4 SCHEDULES – NOT USED

END OF SECTION

JOHNSON COUNTY COURT ADDITION & RENOVATION
CLARKSVILLE, ARKANSAS

24-009A

DIVISION - 13 SPECIAL CONSTRUCTION
13 32 23 CONSTRUCTION STAKING

END OF SECTION

CONSTRUCTION STAKING 13 32 23

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Survey work required for benchmarks, the building layout and the execution of work by others.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES – NOT USED

1.03 SUBMITTALS

- A. PRODUCT DATA: On request of the ENGINEER, submit documentation to verify accuracy of field engineering work.
- B. SHOP DRAWINGS: Submit drawings showing locations of all pipes and structures constructed. This drawing shall be included with the record drawings.

1.04 QUALITY ASSURANCE – NOT USED

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.
- B. DESIGN / PERFORMANCE REQUIREMENTS
 - 1. The CONTRACTOR shall provide and pay for field engineering services for:
 - a. Survey work required in layout and execution of work.
 - b. Civil, structural, or other professional engineering services specified or required to execute the CONTRACTOR's construction method.
 - 2. The method of field staking for the construction of the work shall be at the option of the CONTRACTOR. The OWNER shall provide engineering surveys to establish reference points which in his judgment are necessary to enable the CONTRACTOR to proceed with his work.
 - 3. The accuracy of any method of staking shall be the responsibility of the CONTRACTOR. All engineering for vertical and horizontal control shall be the responsibility of the CONTRACTOR.
 - 4. The CONTRACTOR shall be held responsible for the preservation of all stakes and marks. If any stakes or marks are carelessly or willfully disturbed by the CONTRACTOR, the CONTRACTOR shall not proceed with any work until he has reestablished such points, marks, lines and elevations as may be necessary for the prosecution of the work.
 - 5. The CONTRACTOR shall retain the services of a competent surveyor registered in the State of Arkansas to lay out the work and maintain a survey during construction. The CONTRACTOR shall be solely responsible for the proper location of the work.
- C. Survey Reference Points
 - 1. Locate and protect control points prior to starting site work and preserve all permanent reference points during construction.
 - a. Make no changes or relocations without prior written notice to the ENGINEER.
 - b. Report to the ENGINEER when any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations.

- c. Require surveyor to replace control points which may be lost or destroyed. Establish replacements based on original survey control.

D. Project Survey Requirements

1. Establish temporary benchmarks as needed, referenced to data established by survey control points. Record locations, with horizontal and vertical data, on Record Drawings.
2. Establish lines and levels, and locate and lay out, by instrumentation and similar appropriate means:
 - a. Site improvements, including utility slopes and invert elevations.
 - b. Batter boards for structures.
 - c. Controlling lines and levels required for mechanical and electrical trades.
3. From time to time, verify layouts by the same methods.
4. Establish all lines and grades prior to construction of pipe work for all sewer lines at 100-foot increments.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

A. Records

1. Maintain a complete, accurate log of all control and survey work as it progresses.
2. At contract closeout, submit a survey of installation of structures, site topography, and pipelines at the same scale as the ENGINEER's drawings indicating elevations and pipe stationing at 100-foot increments and at all valves and fitting locations.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION

DIVISION - 22 PLUMBING

- 22 05 00 PLUMBING GENERAL
- 22 05 10 PLUMBING FIRESTOP SYSTEMS
- 22 05 23 PLUMBING VALVES
- 22 05 29 PLUMBING SUPPORT SYSTEMS
- 22 05 48 PLUMBING VIBRATION AND SEISMIC CONTROLS
- 22 05 53 PLUMBING IDENTIFICATION
- 22 05 76 PLUMBING PIPING SPECIALTIES
- 22 07 00 PLUMBING SYSTEMS INSULATION
- 22 11 00 PLUMBING BASIC PIPING
- 22 11 05 PLUMBING NATURAL GAS
- 22 11 16 DOMESTIC WATER
- 22 11 19 PLUMBING DOMESTIC WATER PIPING SPECIALTIES
- 22 13 00 PLUMBING SOIL AND WASTE
- 22 13 19 PLUMBING DRAINAGE PIPING SPECIALTIES
- 22 42 00 PLUMBING FIXTURES
- 22 47 00 PLUMBING WATER COOLERS

END OF SECTION

PLUMBING GENERAL 22 05 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Drawings are diagrammatic, due to scale; therefore, all offsets, fittings, valves and accessories are not shown. Plan work around building details and other trades. In case of interference between trades, Architect-Engineer will decide which work is to take precedence regardless of work that might be installed.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. Wherever applicable, work shall conform to the standards of:
 - 1. OSHA – Occupational Safety and Health Administration
 - 2. NFPA – National Fire Protection Association
 - 3. UL – Underwriters Laboratories
 - 4. ASTM – American Society for Testing and Materials
 - 5. ANSI – American National Standards Institute
 - 6. AGA – American Gas Association
 - 7. ASME – American Society of Mechanical Engineers
 - 8. ADA – American Disabilities Act
 - 9. ARI – American Refrigeration Institute
 - 10. NBS – National Bureau of Standards
 - 11. NSF – National Sanitation Foundation
 - 12. AWWA – American Water Works Association
 - 13. FM – Factory Mutual

1.03 CODES, ORDINANCES, INSPECTIONS AND PERMITS

- A. Work is to be executed and inspected in accordance with local and state codes, laws, ordinances, rules and regulations applicable to particular class of work, and any fees in connection therewith are to be paid by Contractor.
- B. Should any part of Drawings or Specifications be found to be in conflict with applicable codes or ordinances, notify the Architect-Engineer, in writing, within 72 hours prior to receiving of bids. After the receiving of bids, any discovery of code violations shall be promptly reported to the Architect-Engineer. Any work performed knowingly in violation of codes shall be corrected without additional expense to the Owner or his representative.
- C. Arrange with County or State, if City has no ordinances covering work, for complete inspection, paying all charges pertaining thereto. Give proper authority all requisite notice relating to work under such; inform Architect-Engineer and all responsible for all violations of law. Upon completion of work, have work inspected, if required, obtaining certificate of inspection and approval from inspecting agency and deliver such certificate to the Architect-Engineer.
- D. All plumbing work shall be performed by an Arkansas licensed contractor.

1.04 SHOP DRAWINGS AND SUBMITTALS

A. PRODUCT DATA

1. Submit within 30 days after Notice to Proceed, manufacturer's catalog sheets and/or shop drawings covering all phases of work included in this contract.
2. Submittals shall be complete, arranged in sets, indexed and bound in three ring binders that lay flat when opened. No loose sheets or partial submittals will be acceptable.
3. All submittals shall bear written certification to the effect that the Contractor has examined them and found them to be in accordance with specifications and to be dimensionally correct with reference to available space and to related trades.
4. Submittals are required even though equipment being furnished is exactly as specified.

B. SUBSTITUTION OF MATERIALS

1. Final decision as to whether or not a specific piece of equipment meets specifications shall rest with Architect-Engineer.
2. Any proposed substitutions of equipment shall be accompanied by Shop Drawings showing revised equipment layouts, piping diagrams, structural modifications. Where substituted equipment furnished requires use of larger, more, or differently arranged connections, such connections shall be installed to the complete satisfaction of Architect-Engineer, without additional cost to Owner.
3. Should a substitution be accepted and subsequently proven unsatisfactory for the service intended within the warranty period, the contractor shall replace this material or equipment with that as originally specified, or corrected as directed by Architect-Engineer.

C. RECORD SET DRAWINGS

1. At completion of this project, the Contractor shall provide Architect-Engineer with an electronic copy (AutoCAD) on CD plus one hard copy of all drawings showing all work installed by him as well as work connected to manholes.
2. These drawings shall incorporate all changes made in the course of the project so as to enable the Owner to properly maintain, operate and repair both exposed and concealed work.

D. WARRANTY

1. All materials and equipment shall carry a full year's warranty from time Owner accepts building or the date of substantial completion, whichever is earlier, regardless of start-up date of equipment, unless a longer warranty period is specified under other sections.

1.05 QUALITY ASSURANCE – NOT USED

1.06 SYSTEM DESCRIPTION

- A. EXTENT OF WORK – As identified in the drawings and schedules as it relates to this section.

1.07 OWNER'S INSTRUCTIONS AND MAINTENANCE

- A. Refer to Div 01 for the General Requirements for Contract Close-out. Furnish operating and maintenance data for all mechanical equipment.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. Refer to Division I for General Requirements.

- B. Before bidding, make complete investigation at Site in order to be informed as to location of utilities and as to conditions under which work is to be performed. Locations of existing above ground and underground utilities and structures shown were obtained from surveys and/or as built drawings and are not to be assumed as being accurate.
 - C. Make determination of soil conditions before bidding. These specifications and accompanying drawings in no way imply as to condition of soil to be encountered.
- 3.02 DELIVERY, STORAGE, AND HANDLING - NOT USED
- 3.03 PREPARATION - NOT USED
- 3.04 CONSTRUCTION
- A. CUTTING AND PATCHING
 - 1. Provide all cutting and patching required to perform the Mechanical work.
 - 2. All patching will be done by workmen skilled in the trade required.
 - B. EXCAVATION, TRENCHING, AND BACKFILLING
 - 1. All excavation, trenching and backfilling in connection with the Plumbing System is included as part of this Division unless otherwise coordinated by the Contractor.
 - 2. All excavation required shall be done as part of the Bid Price regardless of any implied conditions on the Plans or in these Specifications.
 - 3. Do not carry excavation below required level unless indicated otherwise on the Drawings. Excess excavation below required level shall be backfilled at no expense to Owner with earth, sand, gravel or concrete, as directed by Architect-Engineer and thoroughly compacted. Remove any unstable soil and replace with clean sand or soil and thoroughly compact. Architect-Engineer will determine the depth of removal of any unstable soil encountered. Grade ground adjacent to excavations to prevent water running in. Remove by pumping or other means any water accumulated in excavation.
 - 4. Banks of trenches shall be vertical or as shown on the Drawings. Width of trench to be 5" minimum, 8" maximum on each side of pipe bell. Bottom of trench for sewers and culverts shall be rounded so that an arc of circumference equal to 0.6 of outside diameter or pipe rests on undisturbed soil wherever practicable. Excavate bell holes accurately to size by hand. In rock, excavations shall be carried 8" below bottom of pipe. Use loose earth or gravel for backfill and tamp thoroughly.
 - 5. Bracing, sheathing and shoring shall be performed as necessary to complete and protect excavations indicated on the Drawings, as required for safety, as directed by Architect-Engineer, or to conform to governing laws.
 - 6. After piping, conduit, ducts, etc. have been installed, inspected, tested and approved by governing agency, backfill trenches with clean, stable soil free from stones. Place backfill in 4" layers, tamped under and around pipe and conduit to height of at least 2'-0" above pipe. Tamping shall be done in such manner as not to disturb underlying work. Remainder of trenches and excavations shall be backfilled with clean, stable earth, deposited in 8" layers and brought up to rough grade, with each layer compacted to density of surrounding soil. Remove sheathing and shoring as backfill is placed and fill space with dry sand.
 - 7. Replace existing appurtenances removed or damaged in connection with work, and restore to original conditions, unless otherwise directed.
- 3.05 FIELD QUALITY CONTROL - NOT USED
- 3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK
- A. Do not allow waste material or rubbish to accumulate in or about Job site.

- B. At completion of work, remove all rubbish, tools, scaffolding and surplus materials from and about building, leaving work clean and ready for use without further cleaning required. Clean all equipment, piping, valves, fixtures, and fittings of grease, metal cuttings, insulation cement, dust, dirt, paper labels, etc.
- C. Any discoloration or other damage to buildings, their finishes or furnishings due to failure to properly clean or keep clean plumbing systems shall be repaired without cost to Owner.

PART 4 SCHEDULES - NOT USED

END OF SECTION

PLUMBING FIRESTOP SYSTEMS 22 05 10

PART 1 GENERAL

1.01 SUMMARY

A. GENERAL DESCRIPTION

1. This section applies to Plumbing. Specific requirements for fire-stopping indicated on drawings or in other sections of these specifications shall take precedence over items specified in this section.
2. This section includes:
 - a. Firestop systems for mechanical through-penetrations of the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:
 - i. Floors and ceilings
 - ii. Walls and partitions
 - iii. Smoke barriers
 - iv. Construction enclosed compartmentalized areas
 - b. Firestop systems for containment of fire, heat and smoke in grease/air ducts and pipes passing through the following fire-resistance-rated areas:
 - i. Occupied rooms and storage spaces
 - ii. Mechanical/electrical rooms, shafts, and closets
 - iii. Construction enclosed compartmentalized areas

B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

A. American Society for Testing and Materials Standards (ASTM):

1. ASTM E84: Standard Test Methods for Surface Burning Characteristics of Building Materials
2. ASTM E814: Standard Test Methods for Fire Tests of Through-Penetration Firestops
3. ASTM E119: Standard Test Methods for Fire Tests of Building Construction Materials
4. ASTM E1399: Standard Test Methods for Cyclic Movement and Measuring of Joint Systems
5. ASTM E1725: Standard Test Methods for Fire Tests of Fire-Resistive Barrier Systems of Electrical Systems Components
6. ASTM E1966: Standard Test Methods for Fire Tests of Joints

B. Underwriters Laboratories, Inc. (UL):

1. UL 723 Surface Burning Characteristics of Building Materials
2. UL 1479 Fire Tests of Through-Penetration Firestops, including optional air leak test
3. UL 2079 Fire Test of Building Joint Firestop Systems
4. UL Fire Resistance Directory (Component Listing Test Criteria)

C. National Fire Protection Agency (NFPA)

1. NFPA 80 Standard Fire Door Assembly Tolerances
2. NFPA 252 Standard Fire Test for Fire Rated Doors (not specified for positive or negative furnace test pressure)
3. NFPA 101 Life Safety Code
4. NEC 70 National Electrical Code

D. Definitions:

1. Assembly: Particular arrangement of materials specific to a given type of construction described or defined in referenced documents.
2. Barrier: Any bearing or non-bearing floor, wall, or ceiling assembly that has an hourly fire or smoke rating.
3. Construction Gap: Any joint or opening, whether static or dynamic, within or between adjacent sections of interior or exterior walls, floors, ceilings, or roof decks.
4. Engineering Judgment: Evaluations that are developed by a manufacturer for a new firestop system that complies with similar UL approved designs or tests that are acceptable to the code enforcing authorities.
5. Firestopping: Methods and materials applied in penetrations and unprotected openings to limit the spread of heat, fire, gasses, and smoke.
6. Firestop System: The use of a specific firestop material or combination of materials in conjunction with a specific wall, floor, or ceiling construction type and a specific penetrating material(s) to achieve a rated fire barrier.
7. Intumescent: Materials that expand with heat to seal around objects threatened by fire.
8. Penetration: Opening or foreign material passing through a floor, wall, ceiling barrier such that the full thickness of rated material(s) is breached either in total or in-part.
9. Sleeve: Metal fabrication or pipe section that is a part of system that extends through a barrier.

1.03 SUBMITTALS

- A. PRODUCT DATA: Manufacturer's product literature for each type of firestop material as follows:
 1. Product characteristics, typical uses, installation procedures, performance and limitation criteria.
 2. Material Safety Data Sheets (MSDS)
- B. SHOP DRAWINGS: For each firestop system show construction conditions (including ratings of construction), relationships to adjoining construction, dimension, description of materials and finishes, component connections, anchorage methods, hardware and installation procedures, plus the following:
 1. Firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that confirms compliance with requirements for each condition indicated.

2. Documentation, including illustrations, from a qualified testing and inspection agency that is applicable to each firestop system configuration for construction and penetrating items. Manufacturer furnished installation details must comply with published documents by approved testing agencies (UL, OPL, Warnok Hersey, etc).
 3. Where Project conditions require modification of a qualified testing and inspecting agency's illustration to suit a particular firestop condition, submit illustration, with modifications marked, approved by firestop system manufacturer's fire-protection engineer.
- C. PRODUCT CERTIFICATES: Signed by manufacturers of firestop system products certifying that products furnished, comply with requirements.
- D. PRODUCT TEST REPORTS: From a qualified testing agency indicating that firestop system complies with requirements, based on comprehensive testing of current products.

1.04 QUALITY ASSURANCE

- A. GENERAL: Provide firestop systems that are produced and installed to resist the spread of fire according to requirements indicated, resist passage of smoke and other gasses, and maintain original fire-resistance rating of construction assembly.
- B. F-Rated Systems: Provide firestop systems with F-ratings, as determined per ASTM E814, but no less than that equaling or exceeding fire-resistance ratings of the construction assembly.
- C. T-Rated Systems: Provide firestop systems with T-ratings, as determined per ASTM E814 and ASTM E119, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas.
- D. L-Rated Systems: Provide firestop systems with L-ratings, as determined per ASTM E814, where systems maintain a barrier to cold smoke at all: penetrations, connections with other surfaces, separations required to permit building movement, sound or vibration absorption, and other construction gaps.
- E. For firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
- F. For firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E84.
- G. Qualifications: Fire Protection Installer's Qualifications: Engage an experienced installer who is qualified by having the necessary experience, staff, and training to install manufacturer's products per specified requirements, plus the following:
1. Acceptable to or licensed by manufacturer, state or local authority.
 2. Established a record of successful in-service experience with firestop systems or completion of manufacturer's certified product installation training.
- H. Source Limitations: Obtain firestop systems for each kind of penetration and construction condition indicated, from a single manufacturer.
- I. Fire-Test-Response Characteristics: Provide firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article 1.04.
1. Firestopping tests and follow-up inspection services for firestop systems are performed by a qualified testing and inspection agency acceptable to authorities having jurisdiction.

2. Firestop systems are identical to those tested per ASTM E814 or UL 1479 and comply with the following requirements:
 - a. Firestop system products bear classification marking of qualified testing and inspecting agency.
 - b. Firestop systems correspond to those indicated by reference to firestop system designations listed by the following:
 - i. UL in "Fire Resistance Directory"
 - ii. ITS (Warnock Hersey) in "Directory of Listed Products"
 - iii. Omega Point Laboratories
 - iv. Factory Manual
 - c. Local and State regulatory requirements: Submit forms of acceptance for proposed assemblies not conforming to specific UL Firestop System numbers or UL classified devices.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK – As identified in the drawings and schedules as it relates to this section.
- B. Coordinate construction and sizing of sleeves, openings, core-drilled holes, cut openings and penetrating items to ensure that firestop systems are installed according to specified requirements.
- C. Notify owner's inspecting agency at least seven (7) days in advance of firestop system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover-up or conceal firestop system installations behind other construction until owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.
- E. Copy Architect/Engineer with written record of all inspections of firestop installations. Record should include the date, a list of installations inspected, the name of inspecting agency, and the name of inspecting agency's representative performing the inspection.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE

- A. Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS/EQUIPMENT

A. GENERAL

1. Firestop systems and materials shall meet the requirements specified herein.
2. Architect/Engineer must review and accept in writing any alternates to the firestop system and materials specified herein.
3. Compatibility: Provide firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through the firestop system, under conditions of service and application, as demonstrated by the firestop system manufacturer based on testing and field experience.

B. THROUGH-PENETRATION FIRESTOP SYSTEMS FOR FIRE-RATED ASSEMBLIES:

1. Systems or devices listed in the UL Fire Resistance Directory under categories XHCR (firestop devices) and XHEZ (firestop systems) may be used, providing that they conform to the construction type, penetrant type, annular space requirements and fire rating

involved in each separate instance, and that the system is symmetrical for wall applications. Systems or devices must be asbestos-free.

2. Additional Requirements: Withstand the passage of cold smoke either as an inherent property of the system, or by the use of a separate product included as a part of the UL system or device and designed to perform this function.
 3. All through-penetration Firestop system products must be from a single manufacturer.
 4. Acceptable Products: Those listed in the UL Fire Resistance Directory for the UL System involved and defined in the attached Systems and Applications Schedule.
- C. FIRESTOP SYSTEMS FOR CONDUITS INSTALLED BY THE PLUMBING DIVISION PASSING THROUGH FIRE-RESISTANCE RATED AREAS:
1. Electrical System protection material listed in UL-classified UL 1709, ASTM E119, ASTM E1529, and ASTM E1725.
 2. All firestop system products provided by the mechanical division must be from a single manufacturer.
 3. Acceptable products: Those listed in the UL Fire Resistance Directory for the UL System involved and defined in the material schedule below:
 - a. Fire resistive mats: 3M™ Interam™ Endothermic Mats, 0.3" or 0.4" thick, 24.5" or 49" wide x 16', 20', or 25' long rolls, foil encapsulated with 3M™ logo.
 - b. Smoke and Flame Sealant: 3M™ FireDam™ 150 Caulk
 - c. Foil Tape: 3M™ Interam™ T-49 Aluminum Foil Tape – used as a vapor barrier, radiant heat reflector, and installation aid.
 - d. General Purpose Tape: Scotch® 898 Filament Tape – used as installation aid.
 - e. Composite Sheet: 3M™ Fire Barrier CS-195+ Composite Sheet – used to cover openings and as a collar at the termination of the fire protection envelopes.
 - f. Firestopping Caulk: 3M™ Fire Barrier CP 25WB+ Caulk – used as a smoke and flame sealant.

2.02 FINISHES - NOT USED

2.03 ACCESSORIES

- A. Accessories: Provide components for each firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article 1.04. Use only components specified by firestop systems manufacturer and approved by the qualified testing and inspecting agency for the firestop systems indicated. Accessories include, but are not limited to, the following items:
1. Permanent forming/damming/backing materials, including the following:
 - a. Slag/rock-wool-fiber insulation
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state
 - c. Fire-rated form board
 - d. Fillers for sealants
 2. Temporary forming materials
 3. Substrate primers
 4. Collars and steel sleeves

2.04 FABRICATION - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements.
- B. Examine areas and conditions under which firestop system is to be installed and notify the architect/engineer of conditions detrimental to proper or timely completion of the work.
- C. Examine substrates to determine they are satisfactory to receive firestop system materials.
 - 1. Conduct tests according to firestop systems manufacturer's written recommendations to verify that substrates are free of oil, grease, rolling compounds, incompatible primers, loose mill scale, dirt or other foreign substances capable of impairing bond of fire-resistive materials.
 - 2. Verify objects penetrating firestop materials, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
 - 3. Verify substrates are not obstructed by ducts, piping, equipment, and other suspended construction that will interfere with applying fire-resistive materials.
- D. Verify that environmental conditions are safe and suitable for installation of firestop materials.
- E. Do not proceed with installation of firestop system until unsatisfactory conditions have been corrected by the contractor in a manner acceptable to the architect/engineer.

3.02 DELIVERY, STORAGE, AND HANDLING

- A. Deliver firestop systems products to project site in original, unopened containers or packages with intact and legible manufacturer's labels identifying product and manufacturer, date of manufacture, lot number, shelf life, qualified testing and inspection agency's classification marking, curing time, and mixing instructions.
- B. Store and handle materials for firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes. Follow manufacturer's instructions.

3.03 PREPARATION

- A. JOB CONDITIONS
 - 1. Clean and repair substrates that could impair the adhesion or proper fitting of firestop materials, including oil, grease, rolling compounds, incompatible primers, and loose mill scale.
 - 2. Secure all pipe, conduit, cable and other items which penetrate firestop materials.
 - 3. Provide masking and temporary covering, as required, to prevent contamination of adjacent surfaces by firestop materials.
- B. SURFACE PREPARATIONS
 - 1. Existing Conditions: Verify the condition of the substrates and correct unsatisfactory conditions before installing firestop system products; follow manufacturer's instructions.

2. Environmental Limitations: Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestop systems.
3. Ventilation: Ventilate firestop systems during installation per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.
4. Protection: Provide masking and drop cloths to prevent contamination of surfaces by firestop system materials.

3.04 INSTALLATION

A. CONSTRUCTION/INSTALLATION

1. Installation of firestop systems shall be performed in strict accordance with manufacturer's detailed installation instructions and procedures.
2. Extend firestop material in full thickness over entire area of each substrate or opening to be protected.
3. Protect firestop material from damage on surfaces subject to traffic.

B. COORDINATION WITH OTHER WORK - NOT USED

C. INSTALLATION OF THROUGH-PENETRATION FIRESTOP SYSTEMS

1. Install through-penetration firestop systems to comply with Article 1.04 and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated. (See Article 4.01 "Through-Penetration Firestop Systems Schedule")
2. Install forming/damming/backing materials and other accessories of types required to support fill material during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - a. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop system.
3. Install fill materials for firestop systems by proven techniques to produce the following results:
 - a. Fill voids and activities formed by openings, forming materials, accessories and penetrating items as required to achieve fire-resistance ratings indicated.
 - b. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - c. For fill materials that will remain exposed after completing work, finish to produce smooth, uniform surfaces that are flush with adjoining surfaces.

3.05 FIELD QUALITY CONTROL

A. FIELD QUALITY CONTROL - GENERAL

1. Proceed with enclosing through-penetration firestop systems with other construction only after inspection and approval by code authorities.
2. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.
3. Inspection Agency: If required, owner will engage a qualified independent inspecting agency to inspect through-penetration firestop systems and to prepare test reports

indicating whether through-penetration firestop systems comply with or deviate from requirements.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

A. CLEANING AND PROTECTION

1. Clean off excess fill materials adjacent to openings as work progresses using methods and cleaning materials that are approved in writing by through-penetration firestop systems manufacturer and that do not damage materials in which openings occur.
2. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop system complying with specified requirements.

PART 4 SCHEDULES

4.01 THROUGH PENETRATION FIRESTOP SYSTEMS SCHEDULE

Penetrating Item	Concrete	Gypsum	Wood Floor/Ceiling
Blanks 0000 Series	CAJ0004 CS-195+, GIS CAJ0007 MPS-2+ CAJ0008 2000, 2000+ CAJ0009 CP 25WB+ CAJ0060 1000, 1003 FA0004 CS-195+ WJ0003 2001		
Metallic Pipes 1000 Series	CAJ1001 CP 25WB+ CAJ1006 CS-195+, FS-195+ CAJ1009 2000, 2000+ CAJ1013 2000, 2000+ CAJ1014 2000, 2000+ CAJ1017 FD-150 CAJ1027 MPS-2+ CAJ1044 CP 25WB+ CAJ1052 CP 25WB+ CAJ1058 2000, 2000+, 2003 CAJ1060 2000, 2000+ CAJ1066 CP 25WB+ CAJ1091 CP 25WB+ CAJ1092 CP 25WB+ CAJ1112 FS-195+, CP 25WB+ CAJ1160 CP 25WB+ CAJ1175 CP 25WB+ CAJ1176 CP 25WB+ CAJ1188 2000+ CAJ1216 CP 25WB+ CAJ1225 CP 25WB+ CAJ1241 CP 25WB+	WL1001 CP 25WB+ WL1003 CP 25WB+ WL1009 2000, 2000+ WL1010 2000, 2000+ WL1016 CP 25WB+ WL1017 CP 25WB+ WL1032 CP 25WB+ WL1036 FD-150 WL1037 CS-195+, FS- 195+, GIS WL1067 CP 25WB+ WL1073 CP 25WB+ WL1077 CP 25WB+ WL1080 MPS-2+ WL1082 2000+ WL1084 2000+ WL1096 CP 25WB+ WL1133 CP 25WB+ WL1146 CP 25WB+ WL1157 1000 WL1166 CP 25WB+, MPS-2+ WL1167 FD-150+	FC1002 CP 25WB+ FC1003 2000, 2000+ FC1006 CP 25WB+ FC1015 CP 25WB+ FC1029 CP 25WB+ FC1036 CP 25WB+ FC1060 FD-150+

	CAJ1274 CP 25WB+ CAJ1275 FireDam™ Spray CAJ1292 1000, 1003 CAJ1306 CP 25WB+ CAJ1317 FD-150+ CBJ1020 CS-195+, FS- 195+, GIS FA1002 CP 25WB+ FA1011 CP 25WB+ FB1006 CP 25WB+ WJ1010 CP 25WB+ WJ1023 2001		
Non-Metallic Pipes 2000 Series	CAJ2001 FS-195+, 1" & 2" wide, PPDs CAJ2002 FS-195+ CAJ2003 CS-195+, FS- 195+, GIS CAJ2005 FS-195+ CAJ2006 FS-195+ CAJ2019 2000, 2000+ CAJ2027 FS-195+, CP 25WB+ CAJ2028 FS-195, MPS- 2+ CAJ2029 FS-195+, PPDs CAJ2030 CS-195+, FS- 195+, GIS CAJ2044 FS-195+, CP 25WB+ CAJ2117 FS-195+ CAJ2133 FS-195+ CAJ2143 FS-195+ CAJ2144 CP 25WB+ CAJ2161 CP 25WB+ CAJ2189 FS-195+ CAJ2213 CP 25WB+ CAJ2214 Ultra GS CAJ2216 Ultra GS CAJ2226 Ultra PPD CAJ2227 Ultra PPD CAJ2228 Ultra GS CAJ2241 Ultra GS CAJ2242 Ultra GS CBJ2007 CP 25WB+ FA2002 CS-195+, FS- 195+, MPS-2+, PPDs FA2021 CS-195+, FS- 195+, MPS	WL2002 FS-195+, PPDs WL2003 FS-195+ WL2004 FS-195+ WL2005 FS-195+, 4" wide WL2006 FS-195+ WL2031 CS-195+, FS-195+, GIS WL2032 CS-195+, FS-195+, GIS WL2033 FS-195+ WL2073 FS-195+ 1" wide, PPDs WL2087 FS-195+ WL2088 CP 25WB+, MPS-2+ WL2090 FS-195+ WL2091 MPS-2+ WL2092 FS-195+ WL2097 CP 25WB+, MPS-2+ WL2099 FS-195+ WL2112 CP 25WB+ WL2146 CP 25WB+, Caulk WL2147 Ultra GS, CP 25WB+, MPS- 2+WL2148 Ultra GS WL2149 Ultra GS WL2150 Ultra GS WL2154 Ultra GS, CP 25WB+WL2162 Ultra PPD	FC2002 FS-195+, PPDs FC2007 FS-195+, PPDs FC2008 FS-195+ FC2024 FS-195+, 1" & 2" wide, PPDs FC2026 FS-195+ FC2028 FS-195+, 1" & 2" wide, PPDs FC2039 CP 25WB+, MPS-2+ FC2064 FS-195+ FC2073 CP 25WB+ FC2092 FS-195+, CP 25WB+ MPS-2+ FC2115 FS-195+, Ultra GS FC2116 FS-195+, CP 25WB+ FC2129 Ultra PPD FC2134 CP 25WB+ FC2141 CP 25WB+, Ultra GS
Penetrating Item	Concrete	Gypsum	Wood Floor/Ceiling
Non-Metallic Pipes	FA2027 FS-195+ FA2033 Ultra GS, Ultra	WL2172 1000 WL2173 1000	

<p>2000 Series (CONT'D)</p>	<p>PPD, CP 25WB+ caulk, GIS FA2041 Ultra GS FA2045 Ultra GS FB2005 Ultra GS, 1000 FB2006 Ultra GS, MPS- 2+, 1000 WJ2012 FS-195+, 1" wide, PPDs WJ2029 CP 25WB+, MPS-2+</p>	<p>WL2174 1000 WL2180 Ultra GS, CP 25WB+, MPS-2+</p>	
<p>Insulated Pipes 5000 Series</p>	<p>CAJ5001 CP 25WB+ CAJ5002 FS-195+ CAJ5003 FS-195+ CAJ5005 MPS-2+ CAJ5009 2000, 2000+ CAJ5017 FS-195+, CP 25WB+ CAJ5022 FS-195+ CAJ5024 FS-195+ CAJ5030 CS-195+, FS- 195+, GIS CAJ5041 2000, 2000+ CAJ5060 CP 25WB+ CAJ5074 2000+ CAJ5080 FS-195+ CAJ5119 CP 25WB+ CAJ5125 1000, 1003 CBJ5002 CP 25WB+ CBJ5003 FS-195+ FA5001 FS-195+, CP 25WB+ WJ5013 CP 25WB+ WJ5014 CP 25WB+ WJ5015 CP 25WB+</p>	<p>WL5001 FS-195+ WL5002 FS-195+ WL5009 FS-195+ WL5010 FS-195+ WL5011 CP 25WB+ WL5032 2000, 2000+ WL5038 CP 25WB+ WL5039 CP 25WB+ WL5040 CP 25WB+ WL5045 CP 25WB+ WL5053 2000+ WL5089 1000</p>	<p>FC5002 FS-195+ FC5008 FS-195+ FC5009 CP 25WB+</p>
<p>Combos 8000 Series</p>	<p>CAJ8001 CS-195+, FS- 195+, GIS CAJ8003 2000, 2000+ CAJ8013 FS-195+, CP 25WB+ CAJ8060 PPD, CP 25WB+, MPS-2+ CAJ8069 CS-195+, FS- 195+, GIS, CP 25WB+ CAJ8072 CP 25WB+ CAJ8073 3M Mortar, FS- 195+, CP 25WB+, MPS- 2+ CAJ8075 1000, 1003 CBJ8004 CS-195+, FS- 195+, GIS</p>	<p>WL8002 CS-195+, FS-195+ WL8010 FS-195+, CP 25WB+ WL8021 FS-195+, CP 25WB+ WL8022 1000</p>	<p>FC8012 FS-195+ FC8013 PPDs</p>

	CBJ8005 CS-195+, MPS-2+ CBJ8008 2001 FA8001 FS-195+, CP 25WB+ FB8001 PPD, CP 25WB+, MPS-2+		

END OF SECTION

PLUMBING VALVES 22 05 23

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Valves specified in this section are for general use. See Specifications for specific system for special valves.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. AWWA C606
- B. ASME B 16.5
- C. ASME B 16.18
- D. ASME B 1.20.1
- E. MSS-SP45

1.03 SUBMITTALS

- A. PRODUCT DATA
 - 1. Submit brochures and other data for approval of all items specified.
- B. SHOP DRAWINGS - NOT USED

1.04 QUALITY ASSURANCE

- A. ASME Compliance: ASME B31.9 for building services piping valves.
 - 1. Exceptions: Domestic hot- and cold-water piping valves unless referenced.
- B. ASME Compliance for Ferrous Valves: ASME B16.10 and ASME B16.34 for dimension and design criteria.
- C. NSF Compliance: NSF 61 and NSF 372 for valve materials for potable-water service.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK – As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTION AND MAINTENANCE

- A. Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS/EQUIPMENT

- A. VALVES, GENERAL
 - 1. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

2. Valve Sizes: Same as upstream pipe, unless otherwise indicated.
 3. Valve Actuators:
 - a. Handwheel: For valves other than quarter-turn types.
 - b. Lever Handle: For quarter-turn valves NPS 6 and smaller, except plug valves.
 4. Extended Valve Stems: On insulated valves.
 5. Valve Flanges: ASME B16.1 for cast-iron valves, ASME B16.5 for steel valves, and ASME B16.24 for bronze valves.
 6. Valve Grooved Ends: AWWA C606.
 - a. Solder Joint: With sockets according to ASME B16.18.
 - i) Caution: Use solder with melting point below 840 deg F for angle, check, gate, and globe valves; below 421 deg F for ball valves.
 - b. Threaded: With threads according to ASME B1.20.1.
 7. Valve Bypass and Drain Connections: MSS SP-45.
- B. GATE VALVES**
1. 3": Nibco F-619-RW, iron body, bronze mounted, flanged ends, non-rising stem.
- C. SWING CHECK VALVES**
1. 1/4" THROUGH 2": Nibco T-413-Y-LF, 200-lb CWP, bronze, threaded ends, lead free.
 2. 2½" AND LARGER: Kennedy 1106 Series, 200-lb CWP, iron body, resilient seated, flanged ends, lead free.
- D. BALL VALVES**
1. 1/4" THROUGH 3": Watts LFB 6080-G2-SS, bronze body, stainless steel ball and trim, full port, threaded ends, Teflon seat, two piece, lead free.
- E. BALANCING VALVES**
1. 1/2" AND LARGER: Watts LFCSM-61, 125 psi @ 200°F, brass, ball-type with memory stop.
- 2.02 FINISHES - NOT USED
- 2.03 ACCESSORIES - NOT USED
- 2.04 FABRICATION - NOT USED

PART 3 EXECUTION

- 3.01 EXAMINATION OF SITE
- A. REFER TO DIVISION 1 for General Requirements.
- 3.02 DELIVERY, STORAGE, AND HANDLING – NOT USED
- 3.03 PREPARATION
- A. JOB CONDITIONS – NOT USED
 - B. SURFACE PREPARATIONS

1. Valves specified under specific systems shall take precedence over those as specified herein.
2. Valves in copper pipe shall have threaded ends (except where size dictates flanged ends), use copper to MPT adapters.
3. The use of threaded ends or flanged ends is the Contractor's option within the size listed.

3.04 CONSTRUCTION

A. CONSTRUCTION/INSTALLATION

1. Valves shall be located in an accessible position or made accessible through access panels. Refer to Section 22 11 00 for access panels.
2. Where several valves are related as to function, they shall be grouped in a battery.
3. No valve shall be installed with stem below horizontal position without prior approval.
4. Provide special handles or operators as might be required or as indicated on the drawings.
5. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
6. Install valves in horizontal piping with stem at or above center of pipe.
7. Install valves in position to allow full stem movement.
8. Install check valves for proper direction of flow and as follows:
 - a. Swing Check Valves: In horizontal position with hinge pin level.
9. Refer to Division 22 Section "Plumbing-General" for basic piping joint construction.
10. Grooved Joints: Assemble joints with keyed coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
11. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

3.05 FIELD QUALITY CONTROL - NOT USED

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

PART 4 SCHEDULES - NOT USED

END OF SECTION

PLUMBING SUPPORTING SYSTEMS 22 05 29

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION - Provide adequate pipe, equipment foundation and suspension systems in accordance with recognized engineering practices, using, where possible, standard, commercially accepted hangers and accessories.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. All pipe hangers and supports shall conform to the latest requirements of the Code for Pressure Piping, Refrigeration Piping ANSI/ASME B31.5-74 and Manufacturers' Standardization Society of Valve & Fittings Industry Documents MSS-SP-58-75 and MSS-SP-69-76.
- B. All auxiliary steel necessary for the installation of the pipe hangers and supports shall be designed in accordance with the AISC 1978 Specification and Requirements of Section 05 50 00 MISCELLANEOUS METALS, and as indicated on the Drawings.
- C. Supporting systems shall comply with local mechanical and plumbing codes.
- D. AWS D1.1
- E. ASTM A780
- F. SSPC – PA 1

1.03 SUBMITTALS - NOT USED

1.04 QUALITY ASSURANCE

- A. Engineering Responsibility: Design and preparation of Shop Drawings and calculations for each multiple pipe support and trapeze, and selection of appropriate hangers and anchors to base building structure by qualified professional engineer.
 - 1. Professional Engineer Qualifications: Professional engineer legally qualified to practice in the project state and experienced in providing engineering services kind indicated. Engineering services are defined as those performed for installations of hangers and supports that are similar to those indicated for this Project in material, design, and extent.
 - 2. Certification letter: A letter, sealed and signed by qualified professional engineer licensed to practice engineering in the project state, certifying conformity to the applicable governing codes and criteria specified in the Contract Documents.

1.05 SYSTEM DESCRIPTION

- A. Supporting Steel not shown for the equipment will be designed, supplied and erected by the Contractor. (The supporting steel is that steel which is connected to the structure shown on the Drawings and carries the weight of the mechanical items.) This supporting steel design must carry the dead weight and dynamic load imposed by the equipment.
- B. The supporting steel shall be connected to the structure in such a manner as not to overload the structure. It is the responsibility of the mechanical contractor and the steel fabricator to

verify that this purpose is accomplished. It is the responsibility of the mechanical contractor to call to the attention of the Architect-Engineer any deficiency prior to bidding.

- C. Where thermal movement in the pipeline will occur, the pipe hanger assembly must be capable of supporting the line in all operating conditions. Accurate weight balance, calculations shall be made to determine the supporting force at each hanger in order to prevent excessive stress in either pipe or connected equipment.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE

- A. Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS/EQUIPMENT

NOTE: Numbers refer to GRINNELL; equal devices by B-Line will be acceptable.

A. CONCRETE INSERTS

- 1. Inserts shall be Figures 281, 282 or Powerstrut 359 stanchion where a continuous insert is required.

B. BEAM & STEEL JOIST CLAMPS

- 1. Clamps shall be Figures 133, 134, 218, 225, 226, 228, or 292.

C. RISER CLAMPS

- 1. Riser clamps shall be Figure 261, for steel pipe or Figure CT121 for copper tubing.

D. HANGER RODS

- 1. Hanger rods shall be Figures 140 and 146. Eye rods shall be Figures 248 and 248L.

E. PIPE HANGERS

- 1. All hangers for piping 2" or larger shall be provided with means of vertical adjustment.
- 2. On uninsulated copper tubing, hangers shall be Figures CT-65, CT-69, CT-99, CT-109, OR CT-122R.
- 3. On hot insulated steel pipe, hangers shall be Figure 295 or welded attachments, Figure 60. Where thermal movement causes the hanger rod to deviate more than 5° from the vertical, or where longitudinal expansion causes a movement of more than 1/2" in the piping supported from below, roller hangers Figures 171, 181, 271, or 274 shall be used in conjunction with a protection saddle. Figures 160 thru 165 to suit the insulation thickness. On insulated steel pipe for chilled or hot water or similar service, the hanger must be placed on the outside of the insulation with a Figure 167 Shield.
- 4. On insulated copper tubing, hangers shall be Figures 70, 97, 104, or 108 and shall be placed on the outside of the insulation with a Figure 167 Shield. The Figure 167 Shield shall be applied to distribute the hanger load over the insulation and to eliminate damage to the vapor barrier on the covering.
- 5. Base supports shall be Figures 259 or 264.

F. BRACKETS AND RACKS

- 1. Welded steel brackets shall be Figures 194, 195 and 199. Multiple pipe racks or trapeze hangers shall be fabricated from Powerstrut channel, clamps, and accessories.

G. GUIDES AND SLIDING SUPPORTS

1. Guides shall be Figures 171, 175, 177, or 256. Sliding supports shall be Figures 280, 432, 435, 436, 437, or 438.

H. ROOF PENETRATIONS

1. Pipe roof penetrations shall be made with PATE or ROOF PRODUCTS AND SYSTEMS CORP. devices, installed as recommended by the manufacturer.

I. AUXILIARY STEEL

1. Furnish all miscellaneous structural members necessary to hang or support pipe or mechanical equipment. Material of members shall be consistent with that of the main structural system.
2. All auxiliary steel shall receive one shop coat of primer paint prior to installation.
3. Notify Architect-Engineer of any adjustment necessary in main structural system for proper support of major equipment.

J. CONCRETE PADS

1. Provide four inch thick concrete pads under all floor-mounted equipment and apparatus. Dowel into structural floor slab.

2.02 FINISHES - NOT USED

2.03 ACCESSORIES - NOT USED

2.04 FABRICATION - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements.

3.02 DELIVERY, STORAGE, AND HANDLING - NOT USED

3.03 PREPARATION - NOT USED

3.04 CONSTRUCTION/INSTALLATION

A. ATTACHING TO STRUCTURE

1. Where equipment or piping is supported off a concrete structure, inserts shall be used. Where support rod sizes exceed 7/8" diameter or where the pipe load exceeds the recommended load for the insert, use 2 inserts with a trapeze type connecting member below the concrete. In cases where pipes are supported from existing slab, use Phillips; "RED HEAD" or equal, sized for Safety Factor 4.
2. Where equipment or piping is supported from building steel beam, clamps or welded beam attachments shall be used. Holes drilled in building steel for hanger support rods will not be permitted.
3. All vertical runs of piping shall be supported at each floor.

B. HANGER RODS AND SPACING

1. Where hanger rod sizes are catalog-listed for a specified hanger, this size shall govern. Where hanger rod sizes are not catalog-listed, the load on the hanger shall be the determining factor and the maximum recommended hanger rod load as catalog-listed, shall govern.
2. Pipe hangers shall be at each change in direction, not more than 2'-0" from end of run and on straight runs at each joint or the spacing shall not exceed whichever is closer:

3.

<u>PIPE SIZE</u>	<u>PVC PIPE</u>	<u>COPPER</u>
To 3/4"	4'-0"	5'-0"
1" To 2"	5'-0"	8'-0"
2-1/2" To 4"	7'-0"	10'-0"
5" To 8"	8'-0"	10'-0"
10" and Larger	10'-0"	10'-0"

4. Provide supports at concentrated loads such as equipment, in-line pumps, valves and other piping specialties, to prevent line sag and/or excess stress in the piping systems.
5. For cast iron pipe provide hanger at each joint or fitting with a maximum spacing of 5'-0" on center.
6. Where distance between riser clamp and hanger exceed 10'-0" in height, intermediate clamps shall be installed to provide support or alignment at a maximum of every 10'-0".
7. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.

C. Insulated Piping: Comply with the following:

1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits according to ASME B31.1 for power piping and ASME B31.9 for building services piping.
2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
5. Insert Material: Length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

D. EQUIPMENT SUPPORTS

1. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
2. Grouting: Place grout under supports for equipment and make smooth bearing surface.
3. Provide lateral bracing, to prevent swaying, for equipment supports.

E. METAL FABRICATIONS

1. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
2. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
3. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.05 FIELD QUALITY CONTROL - NOT USED

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

A. ADJUSTING

1. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. PAINTING

1. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - a. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
2. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

PART 4 SCHEDULES - NOT USED

END OF SECTION

PLUMBING IDENTIFICATION 22 05 53

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: This Section includes the mechanical identification materials and their installation on the required Plumbing equipment. Included identification materials are Equipment nameplates, markers, and signage, and markers for access panels, pipes, and valve tags.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. ASME A13.1, "Scheme for the Identification of Piping Systems,"
- B. ASTM D709

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Not Used
- C. Valve numbering scheme.
- D. Valve Schedules: For each piping system. Furnish extra copies (in addition to mounted copies) to include in maintenance manuals.

1.04 QUALITY ASSURANCE

A. PIPE IDENTIFICATION

- 1. All piping in mechanical spaces, in unfinished space, and above lift out ceilings, shall be identified with pressure-sensitive pipe markers with color bands of the proper size. Markers shall have proper legend and meet OSHA Specifications and the latest requirements of ANSI A13.1. Where pipes are too small for such application, a 1-1/2" brass tag shall be used. Do not identify exposed piping in the finished areas.
- 2. Markers shall be applied to the piping at the following locations:
 - a. Adjacent to each valve.
 - b. At each branch and riser take-off.
 - c. At each pipe passage through wall, floor and ceiling construction.
 - d. At each pipe passage to underground.
 - e. At not more than 40'-0" spacing on straight pipe runs.

B. VALVE AND EQUIPMENT IDENTIFICATION

- 1. Provide brass tags for all valves with legend describing function of each valve. Tag shall also indicate normally open or normally closed.
- 2. Provide nameplates for all plumbing equipment.

1.05 SYSTEM DESCRIPTION

A. EXTENT OF WORK – As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE

A. Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS/EQUIPMENT

A. EQUIPMENT IDENTIFICATION DEVICES

1. Equipment Nameplates: Metal, with data engraved or stamped, for permanent attachment on equipment.
 - a. Data:
 - i. Manufacturer, product name, model number, and serial number.
 - ii. Capacity, operating and power characteristics, and essential data.
 - iii. Labels of tested compliances.
 - b. Location: Accessible and visible.
 - c. Fasteners: As required to mount on equipment.
2. Equipment Markers: Engraved, color-coded laminated plastic. Include contact-type, permanent adhesive.
 - a. Terminology: Match schedules as closely as possible.
 - b. Data:
 - i. Name and plan number.
 - ii. Equipment service.
 - iii. Design capacity.
 - iv. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
 - c. Size: Minimum 2-1/2 by 4 inches for control devices, dampers, and valves; minimum 4-1/2 by 6 inches for equipment.
3. Equipment Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine sub-core, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.
 - a. Data: Instructions for operation of equipment and for safety procedures.
 - b. Engraving: Manufacturer's standard letter style, of sizes and with terms to match equipment identification.
 - c. Thickness: Minimum 1/16 inch, unless otherwise indicated.
 - d. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.
4. Access Panel and Door Markers: Minimum 1/16-inch- thick, engraved laminated plastic, with abbreviated terms and numbers corresponding to identification. Provide 1/8-inch center hole for attachment.
 - a. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

B. VALVE TAGS

1. Brass tags shall be minimum of 2" diameter to accommodate 1/2" high numbers and 1/4" high letters. Tag shall be equipped with a brass chain, monel meter seal, or brass "S" hook.

C. PIPE MARKERS & BANDS

1. Markers and band sizes shall conform to the following:

<u>OUTSIDE DIAMETER OF PIPE OR INSULATION</u>	<u>LENGTH OF LETTERING COLOR FIELD</u>	<u>HEIGHT</u>
3/4" to 1-1/4"	8"	1/2"
1-1/2" to 2"	8"	3/4"
2-1/2" to 6"	12"	1-1/4"

2. Marker and band colors, and marker legends shall conform to the following.

<u>PIPING SYSTEM</u>	<u>LEGEND</u>	<u>BAND/LETTER COLOR</u>
DOMESTIC WATER SYSTEM		
Cold Water	Cold Water	Green/White
Hot Water	Hot Water	Yellow/Black
Hot Water Return	Hot Water Return	Yellow/Black
SANITARY SEWER SYSTEM		
Sanitary Waste	Sanitary Sewer	Green/White
Sanitary Vent	Plumbing Vent	Green/White
Condensate	Condensate	Green/White
GAS PIPING SYSTEM		
Natural Gas	Low Pressure Gas	Yellow/Black

3. Arrows shall be of same color as bands and shall be point in direction of flow and indicate normal working pressure.
4. Equipment nameplates shall be white on black laminated plastic.

2.02 FINISHES - NOT USED

2.03 ACCESSORIES - NOT USED

2.04 FABRICATION - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements.

3.02 DELIVERY, STORAGE, AND HANDLING - NOT USED

3.03 PREPARATION - NOT USED

3.04 CONSTRUCTION

- A. INSTALLATION

1. Legends shall be securely fixed to the pipes with full circumference bands on each side of legend. Arrow downstream of legend shall have a full circumference band at the arrow end.

2. Valve tags shall be numbered in accordance with a valve chart, which shall be framed and mounted where directed by Architect-Engineer. Said chart shall describe valve location and function.
 3. Equipment nameplates shall be labeled the same as shown on the contract documents and shall be securely attached to the equipment.
- B. COORDINATION WITH OTHER WORK - NOT USED
- 3.05 FIELD QUALITY CONTROL - NOT USED
- 3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK
- A. Relocate plumbing identification materials and devices that have become visually blocked by other work.
 - B. Clean faces of plumbing identification devices.

PART 4 SCHEDULES - NOT USED

END OF SECTION

PLUMBING PIPING SPECIALTIES 22 05 76

PART 1 GENERAL

1.01 SUMMARY

A. GENERAL DESCRIPTION

1. Specific requirements for plumbing specialties indicated on drawings or in other Sections of these specifications shall take precedence over items as specified in this section.

- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES - NOT USED

1.03 SUBMITTALS

A. PRODUCT DATA

1. Submit brochures and other data for approval of all items specified.

B. SHOP DRAWINGS - NOT USED

1.04 QUALITY ASSURANCE

- A. Ranges for thermometer, gages or similar instruments shall be selected so that normal operation will be near center of scale. Range shall not be longer than required. Use compound gage where vacuum may be encountered.
- B. Combination instruments for thermometers and gages will not be acceptable.
- C. Comply with NSF 61 and NSF 372 for materials that will be contact with potable water.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK – As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE

- A. Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PART 2 - PRODUCTS

2.01 MATERIALS/ EQUIPMENT

A. THERMOMETERS

1. Thermometers shall be equal to Trerice Series Bx9, 9", adjustable type. Stem length shall be a minimum of 3/4 of the pipe diameter, plus socket extension length. Use 12" stem length in tanks.
2. Provide brass separable sockets. For insulation, separable socket shall have extension neck.

B. THERMOMETER WELLS

1. Thermometer wells shall be brass with cap and chain.

2. For uninsulated pipe, wells shall be Trerice No. 5571, 5573 or 5578.
3. For insulated pipe, wells shall be Trerice No. 5574 or 5579.
4. Use maximum stem length compatible with pipe size.

C. GAGES

1. Gages shall be equal to Trerice Series 800, 3-1/2" size.
2. Provide snubber and cock for each gage.

D. TEST PLUGS

1. Test plugs shall be equal to Peterson Engineering Company #110, 1/4" size, with brass body, dust cap and "Nordel" valve core material.
2. Provide Test Kit composing of one 3-1/2" gage (0-100 psi Range); one 3-1/2" gage (30" Vac to 150 psi Range); one dial thermometer with 5" stem, two gage adapters and padded carrying case.

E. STRAINERS

1. "Y" Type:
 - a. Watts LF77S, lead free bronze, 400 lb. WOG, perforated stainless steel screen, retainer cap tapped for closure plug, threaded.
2. SCREENS - WATER:
 - a. Stainless steel.
 - b. Perforations: Up to 2", 1/10" diameter, 49 per sq. in.; 2-1/2" to 4", 1/8" diameter, 32 per sq. in.

2.02 FINISHES - NOT USED

2.03 ACCESSORIES - NOT USED

2.04 FABRICATION - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements.

3.02 DELIVERY, STORAGE, AND HANDLING - NOT USED

3.03 PREPARATION - NOT USED

3.04 CONSTRUCTION

A. INSTALLATION

1. Gages, Thermometers and Test Plugs
 - a. Provide thermometers in hot water and cold water at water heaters, and elsewhere as indicated on Drawings.
 - b. Provide gages where shown on Drawings.
 - c. Arrange thermometers and gages so they might be read standing in a normal position of the floor.

- d. Provide test plugs on inlet and outlet piping of all Heat Exchange Equipment.
- e. Locate gages, thermometers and test plugs as close as possible to equipment being monitored.

2. Strainers

- a. Provide strainers on inlet side of all reduced pressure backflow preventers. Provide service valve upstream of strainer.

B. COORDINATION WITH OTHER WORK - NOT USED

3.05 FIELD QUALITY CONTROL – NOT USED

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK - NOT USED

PART 4 SCHEDULES - NOT USED

END OF SECTION

PLUMBING SYSTEMS INSULATION 22 07 00

PART 1 GENERAL

1.01 SUMMARY

A. GENERAL DESCRIPTION

1. Furnish and install all insulation for Plumbing piping and equipment.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. Insulating materials shall be Underwriters' Laboratories rated non-combustible type, and shall comply with flame spread, smoke developed, and other applicable requirements of local and state Fire Codes and NFPA 90A. Before applying any insulation, submit satisfactory evidence of this compliance.
- B. Thermal insulation materials shall meet the property requirements of one or more of the following specifications as applicable to the specific product or end use:
1. American Society for Testing of Materials Specifications:
 - a. ASTM C 547, "Standard Specification for Mineral Fiber Pipe Insulation"
 - b. ASTM C 1136, "Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation"

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show details for the following:
1. Application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 2. Insulation application at pipe expansion joints for each type of insulation.
 3. Insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
 4. Removable insulation at piping specialties, equipment connections, and access panels.
 5. Application at linkages of control devices.
 6. Field application for each equipment type.
- C. Field quality-control inspection reports.

1.04 QUALITY ASSURANCE

- A. Insulation specified is intended to set a standard. Insulation by other manufacturers will be considered provided that characteristics meet or exceed specified material. Each substitute item shall be submitted for approval.
- B. Specifications apply to supply and associated return system unless specifically specified otherwise.

- C. It is the intent of this Section of the Specifications that all cold surfaces subject to "sweating" be insulated and have a vapor barrier applied.
- D. Furnish insulation thicknesses in excess of that specified herein if so indicated on the drawings.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK – As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE

- A. Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS/EQUIPMENT

A. PLUMBING

1. DOMESTIC COLD WATER (ABOVE-GRADE): Owens-Corning or Knauf 1" thick fiber glass, one piece, pipe insulation with factory-applied White All Service (ASJ) Vapor Barrier Jacket. Fittings shall be molded or mitered fiberglass for sizes under 3" and molded fiber glass for sizes 3" and larger.
2. DOMESTIC HOT WATER AND HOT WATER RETURN (ABOVE-GRADE): Owens-Corning or Knauf 1" thick fiberglass, one-piece, pipe insulation with factory-applied White All-Service (ASJ) Vapor Barrier Jacket. Fittings shall be OC-110 Cement for sizes under 3" and molded fiber glass for sizes 3" and larger. The piping insulation K-value shall not exceed 0.27.
3. AIR CONDITIONING UNIT CONDENSATE DRAINS: Armstrong's AP Armaflex Pipe Insulation ½" thick (Freezer and Refrigerator drains same as domestic cold water at ½" thickness).

2.02 FINISHES - NOT USED

2.03 ACCESSORIES

A. TAPES

1. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136 and UL listed.
 - a. Width: 3 inches.
 - b. Thickness: 11.5 mils.
 - c. Adhesion: 90 ounces force/inch in width.
 - d. Elongation: 2 percent.
 - e. Tensile Strength: 40 lbf/inch in width.
 - f. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
2. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136 and UL listed.
 - a. Width: 3 inches.
 - b. Thickness: 6.5 mils.
 - c. Adhesion: 90 ounces force/inch in width.
 - d. Elongation: 2 percent.
 - e. Tensile Strength: 40 lbf/inch in width.
 - f. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
3. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.

- a. Width: 2 inches.
 - b. Thickness: 6 mils.
 - c. Adhesion: 64 ounces force/inch in width.
 - d. Elongation: 500 percent.
 - e. Tensile Strength: 18 lbf/inch in width.
4. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive and UL listed.
- a. Width: 2 inches.
 - b. Thickness: 3.7 mils.
 - c. Adhesion: 100 ounces force/inch in width.
 - d. Elongation: 5 percent.
 - e. Tensile Strength: 34 lbf/inch in width.

2.04 FABRICATION - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements.

3.02 DELIVERY, STORAGE, AND HANDLING

- A. All of the insulation materials and accessories covered by this specification shall be delivered to the job site and stored in a safe, dry place with appropriate labels and/or other product identification.
- B. The contractor shall use whatever means are necessary to protect the insulation materials and accessories before, during, and after installation. No insulation material shall be installed that has become damaged in any way. The contractor shall also use all means necessary to protect work and materials installed by other trades.
- C. If any insulation material has become wet because of transit or job site exposure to moisture or water, the contractor shall not install such material, and shall remove it from the job site. An exception may be allowed in cases where the contractor is able to demonstrate that wet insulation when fully dried out (either before installation or afterward following exposure to system operating temperatures) will provide installed performance that is equivalent in all respects to new, completely dry insulation. In such cases, consult the insulation manufacturer for technical assistance.

3.03 PREPARATION

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

3.04 CONSTRUCTION

A. CONSTRUCTION/INSTALLATION

1. The application of all insulation shall be performed by experienced mechanics, regularly employed in the trade, in a neat and workmanlike manner. Unless otherwise specified to a greater quality, the application of all insulation shall be in accordance with the manufacturer's recommendations.
2. Omit insulation from the following items:
 - a. Exposed plated plumbing pipe.
 - b. Vents to atmosphere, discharge from safety and relief valves, overflow pipes, and hot only drainpipes.
 - c. Valves, Unions, Flanges, Traps, Strainers, and devices in HOT ONLY piping.

3. Provide protection saddles as required by Section 22 05 29. On pipe sizes 2 1/2" and over, provide 12" length of foam-glass insulation at hangers.
4. Insulation facings shall be acceptable to NFPA Standards 90A and 90B and ASTM C1136.
5. All exposed ends of pipe insulation shall be pointed up neatly with appropriate insulating cement or use pre-molded PVC end caps on cold only piping and preformed aluminum end caps on dual-temp, hot or steam piping.
6. Piping systems shall be tested and cleaned before insulation is applied.
7. Fiber Glass for Cold Piping
 - a. Adhere self-sealing factory-laps on longitudinal joints and adhere 3" self-sealing butt joint strips firmly with a nylon sealing tool squeegee to insure a continuous vapor barrier. Insulate all fittings, molded fittings, or mitered segments to same thickness as the adjacent insulation and vapor seal with two 1/8" wet coats of white vapor barrier mastic reinforced with glass fabric extending 2" onto the adjacent cover fittings with preformed PVC coverings.
8. Fiber Glass for Hot Piping
 - a. Apply insulation to pipe with side and end joints butted tightly. Seal self-sealing jacket laps and butt joint strips with nylon sealing tool. Fittings shall be finished as specified under "COLD PIPING." Cover fitting with preformed PVC covering.
9. Armaflex Pipe Insulation
 - a. Apply in accordance with latest edition of Armstrong's "INSTALLATION INSTRUCTIONS TO THE CONTRACTOR." Apply two coats of Armstrong's WB Vinyl Finish with color selected by engineer.
10. Pipe Insulation Exposed to Weather
 - a. Provide aluminum jacket 0.016" thick and smooth. Provide side and end laps of 2" minimum with cut edge of side lap turned under 1" for smooth edge. Seal laps with weatherproof sealant. Position laps to shed water. Secure jacket in place with bands 1/2" x 0.015" thick placed on 9" centers. Extend exterior insulation and jacketing 2" beyond sleeve inside building.

3.05 FIELD QUALITY CONTROL - NOT USED

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK - NOT USED

PART 4 SCHEDULES - NOT USED

END OF SECTION

PLUMBING BASIC PIPING 22 11 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: General information regarding the plumbing piping in the project.
 - 1. For specific piping requirements and materials, refer to the respective sections for the various systems.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to bidders apply to the Work included in this Division.

1.02 REFERENCES - NOT USED

1.03 SUBMITTALS

- A. PRODUCTS
 - 1. Submit brochures or other data for approval of all items specified.
- B. SHOP DRAWINGS - NOT USED

1.04 QUALITY ASSURANCE

- A. THERMAL EXPANSION
 - 1. Swing joints, turns, pipe anchors, pipe guides, expansion loops or long off-sets shall be provided where necessary to allow for expansion and contraction. Pipe, fittings or equipment, broken during warranty, shall be replaced.
- B. OPEN ENDS
 - 1. Keep ends of pipe, including those extending through and above roof, drains, equipment and fixture branches, closed with caps or plugs to prevent dirt or building material from entering the pipe and traps during construction.
- C. NOISE CONTROL
 - 1. Piping shall be free of any objectionable self-generated noise. Isolate piping from building where required to prevent transmission of noise.
- D. CROSS CONNECTIONS
 - 1. Under any conditions, piping shall not be installed that permits back-siphonage or any flow of polluted water or other liquid into domestic water piping system.
 - 2. Air gaps, receptor type drains and approved vacuum breaking devices shall be provided. Piping to hose-end faucets or to inlet below fixture overflow shall have vacuum breakers of make, design, size and location approved by the applicable code.
 - 3. All pipe and fittings shall be made in the USA and shall be labeled accordingly.
 - 4. For materials to be used on the various piping systems, refer to the specific piping sections for the various systems.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK – As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE

- A. Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS/EQUIPMENT

A. FIRESTOPPING

1. Provide Firestopping at all pipe penetrations of firewalls.

B. CONDENSATE DRAINS

1. See Section 22 13 00.

C. EXPANSION LOOPS

1. Metraflex metraloop, same material as piping.

D. FLEXIBLE PIPE CONNECTORS

1. Double sphere neoprene connectors rated for 150 psi at 220°F. Model MFTFU or MFTNC as manufactured by Mason Industries, Inc. or approved equal.
2. Install control cables when connectors are installed in unanchored piping or connected to isolated equipment and the pressure exceeds values recommended by the manufacturer.

E. FOUNDATION WALL (BELOW GRADE) PENETRATIONS

1. Link - Seal Thunderline pipe seals.

F. ACCESS DOORS

1. Provide access doors for adequate accessibility to valves, drains, traps and other devices requiring access for maintenance where such devices are concealed within inaccessible ceilings, walls or chases.
2. Access doors to 16" x 24" size shall be "VENTLOCK" stamped insulated access doors, 22-gauge paintable galvanized steel.
3. Larger access doors shall be double panel construction with 1" rigid insulation between panels. Doors with largest dimension over 24", but less than 48", shall use "VENTLOCK" series 200 latches, hinges and gasketing, and construction shall be 22-gage paintable galvanized steel. Doors with largest dimension over 48", shall use "VENTLOCK" series 300 latches, hinges and gasketing, and construction shall be 20-gage paintable galvanized steel.
4. All access doors in Detention areas shall be 12-gauge paintable galvanized steel door and frame, with continuous piano hinge. Detention access doors to be "KEES Standard Security Access Panels, Model SSP", or equivalent.
5. Access doors shall be UL listed where fire-proofing membranes are penetrated.
6. Equivalent access doors by Kees or Air Balance are acceptable.
7. Access doors shall be minimum 10" x 12" size.

2.02 FINISHES - NOT USED

2.03 ACCESSORIES

A. SUPPORTS

1. Provide an adequate pipe suspension system in accordance with recognized engineering practices, using, where possible, standard, commercially accepted pipe hangers and accessories. No piping shall be supported by, or from, hangers, supporting electrical conduit.

B. SLEEVES AND PLATES

1. Sleeves shall be used where piping passes through exterior walls; poured-in-place concrete walls, floors or roofs; where required for sealing to meet any sanitation codes, ordinances or laws; and areas where water may accumulate.
2. Sleeves in poured wall construction, and where collapse is possible, shall be Schedule 40 pipe. Other sleeves shall be minimum 22-gage sheet metal.
3. Sleeves accommodating insulated pipe shall be of sufficient diameter to pass piping and full-size insulation.
4. In toilets, kitchens, equipment rooms and other areas where water may have accumulated on the floor, sleeves shall extend 1/2" above the finished floor. Other sleeves shall be flush with finished floor.
5. After all piping has been inserted in sleeves, voids between pipe or insulation and sleeve shall be filled with packing material to within 1/2" of end of sleeve and then filled with silicone sealant.
6. Spring clamp plates (escutcheons) shall be provided where pipes are exposed in occupied rooms and where walls, floors or ceilings are finished. Plates on extended sleeves shall have chrome-plated skirts.
7. In firewalls and not on grade floors, provide fire stopping at all penetrations. Fire stopping materials shall be installed in accordance with the manufacturer's recommendations and UL Listing.
8. Install link seal joints at all below grade foundation wall penetrations to make watertight.

C. EXPANSION LOOPS

1. Provide pipe anchors and pipe guides, and install in accordance with manufacturer's recommendations. Loop joints shall be same as specified for piping system.

2.04 FABRICATION

- A. All pipes shall be cut square and shall have burr and cutting slag removed by reaming or other cleaning methods.
- B. Unions or flanges shall be used at all connections to all equipment to facilitate dismantling, and elsewhere as required, in the erection of pipe or installation of valves.
- C. All joints and changes of direction shall be made with standard fittings. Bending of pipe will be permitted providing a hydraulic bender is used and pipe is not deformed reducing cross sectional area. Reducers shall be used at pipe size changes.
- D. To prevent electrolysis or corrosion, an insulating dielectric union or fitting shall be used between dissimilar metal fitting and/or pipe. Paper is not acceptable as a dielectrical

insulator. Provide an approved insulating method on all underground metallic pipe in contact with dissimilar metals.

- E. Nipples shall be of same material and composition as pipe on which they are installed, and shall be extra heavy when unthreaded shoulder is less than 1-1/2". No running thread nipples will be permitted. Minimum exposed shoulder of any nipple shall not be less than 3/4".
- F. Joints between steel or copper pipe and cast iron shall be made with caulking ferrules.
- G. Cast iron soil pipe and fittings shall be assembled with approved molded push-on type gaskets. State-approved no hub pipe may be used where applicable.
- H. Copper pipe shall be assembled with wrought copper fittings. All joints shall be made with "SIL-FOS". Pipe, fittings and faucets used for domestic water shall be NSF 61 compliant.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements.

3.02 DELIVERY, STORAGE AND HANDLING - NOT USED

3.03 PREPARATION - NOT USED

3.04 CONSTRUCTION

A. INSTALLATION

- 1. Exposed lines are to be run parallel with, or perpendicular to, building lines and wherever possible shall be grouped together for easier service and identification. Lines requiring a definite grade for drainage shall have precedence in routing over all other lines. Wherever possible, horizontal and vertical lines shall be held as close as possible to walls, ceilings, struts and members so as to occupy minimum space consistent with the proper requirements for insulation, expansion, removal of pipe and access to valves. All concealed work shall finish off within limits permitted by vertical or horizontal chases. Arrange for concealment of all piping in finished area of buildings unless otherwise noted.
- 2. Piping shall be worked into place without springing and/or forcing. All piping shall be arranged so as not to interfere with removal of other equipment or devices, not to block access to doors, windows, manholes, or other access openings.
- 3. All piping shall be installed so as to avoid liquid or air pockets throughout the work. Piping shall be erected and pitched to insure proper draining. Air vents, manual or automatic shall be installed where required.
- 4. All exposed fixture branches shall be chrome-plated.
- 5. Flexible Pipe Connectors
 - a. Install flexible pipe connectors where shown on the Drawings and as required by other sections.
 - b. Install connectors as close as possible to equipment inlets and outlets.

B. COORDINATION WITH OTHER WORK

- 1. Support pipe work independently of flexible connectors. Brace and anchor piping as required to prevent movement of piping ends of flexible connectors and align all equipment, pipe work, and flanges so that no flexible connectors shall be misaligned and/or stressed beyond the manufacturer's recommended limits.

3.05 FIELD QUALITY CONTROL

- A. Test all piping systems provided under this Contract as hereinafter specified and furnish to the Architect-Engineer copies of the test reports signed by the Contractor.
- B. Piping located underground shall be tested and inspected by the governing agency before backfilling.
- C. Equipment and personnel required for these tests shall be furnished without additional cost. Testing equipment shall be as required for particular test, with all equipment and gages accurate and in good working order.
- D. Equipment subject to damage at given test pressure shall be removed from line before pressure is applied. Use proper plugs or caps.
- E. See specific piping system specification for test pressure, duration and medium.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK - NOT USED

PART 4 SCHEDULES - NOT USED

END OF SECTION

PLUMBING NATURAL GAS 22 11 05

PART 1 GENERAL

1.01 SUMMARY

A. GENERAL DESCRIPTION

1. This system shall consist of all gas piping as indicated on the drawings including distribution and connection to every gas appliance furnished, installed or connected under this contract.

- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. NFPA 54, "National Fuel Gas Code."

- B. NFPA 70

- C. ASTM A53

- D. ANSI/ AWS D1.1

- E. ASME B 1.20.1

- F. ASME B 16.33

- G. ANSI/ ASME 816.3

- H. ANSI 221.15

- I. ANSI 221.21

- J. ANSI 221.24

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.

- B. Field quality-control test reports.

- C. Operation and maintenance data.

1.04 QUALITY ASSURANCE

- A. All work to comply with the requirements of the gas utility company, local codes, NFPA Pamphlet No. 54 and Other Sections of these Specifications.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK – As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE

- A. Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS/EQUIPMENT

- A. PIPE: Pipe shall be Schedule 40 Black steel conforming to ASTM A53, assembled with malleable iron (ANSI/ASME 816.3) or formed steel welding fittings. Use welding fittings on 2" and above, on all buried piping, and on all piping systems above 14" w.c. operating pressure. Welding shall conform to ANSI/AWS D1.1. Thread sealant shall be suitable for Natural Gas service.
- B. PIPE BELOW GRADE: Pipe below grade shall be coated and wrapped. Straight lengths shall be furnished with factory-applied electrically insulating coating. Fittings and damaged coating shall be wrapped with tapecoat CT applied in accordance with manufacturer's latest printed instructions. Provide cathodic protection by sacrificial anode for all underground piping.
 - 1. If approved by the local code authority, Driscopipe 6500 or other polyethylene piping systems with heat fusion joints approved for Natural Gas service may be used below grade. Install to conform to manufacturer's recommendations and local code authority requirements.
- C. GAS PRESSURE REGULATORS: Gas pressure regulators, where indicated, shall be internally vented type. Vent to the outside when applicable. Do not install above ceilings.
- D. PIPING SPECIALTIES
 - 1. Flexible Connectors: ANSI Z21.24, copper alloy.
- E. SPECIALTY VALVES
 - 1. Valve End Connections: Threaded, according to ASME B1.20.1.
 - 2. Appliance Connector Valves: ANSI Z21.15 and CSA International listed and approved for use with Natural Gas.
 - 3. Gas Stops: Bronze body with AGA stamp, plug type with bronze plug and flat or square head, ball type with chrome-plated brass ball and lever handle, or butterfly valve with stainless-steel disc and fluorocarbon elastomer seal and lever handle; 2-psig minimum pressure rating. Valve shall be approved for Natural Gas service.
 - 4. Gas Valves: ASME B16.33 and CSA International-listed bronze body and 125-psig pressure rating. Valve shall be approved for Natural Gas service. Refer to specification section "PLUMBING VALVES 220523" for additional valve requirements.
 - 5. Automatic Gas Valves: ANSI Z21.21, with electrical operator for actuation by appliance automatic shutoff device. Valve shall be approved for Natural Gas service.
 - 6. Earthquake Valves: Listed in CSA International's "Certified Product Listing Directory: Components for Gas and Electrical Equipment" as complying with ASCE 25 and UL listed.
 - a. Earthquake-Valve: Working-pressure rating is 5 psig. Cast-aluminum body with nickel-plated chrome steel internal parts. Nitrile valve washer. Sight windows for visual indication of valve position. Threaded end connections. Wall mounting bracket with bubble level indicator. Valve shall be approved for Natural Gas service.

2.02 FINISHES - NOT USED

2.03 ACCESSORIES - NOT USED

2.04 FABRICATION - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER DIVISION 1 for General Requirements.

3.02 DELIVERY, STORAGE, AND HANDLING - NOT USED

3.03 PREPARATION - NOT USED

3.04 CONSTRUCTION

A. INTERNAL PIPING

1. Provide gas cock and dirt leg at each appliance and where indicated on drawings. Provide dielectric flanges at dissimilar metal connections and where indicated on drawings.
2. Valves shall not be installed above ceilings.

B. COORDINATION WITH OTHER WORK

1. The contractor shall coordinate the installation of the gas service with the local gas utility. The gas service will be paid for by the Owner.

C. Install pressure gage downstream from each service pressure regulator. Pressure gages are specified in Div 22 - Piping Specialties.

D. Concealed Locations: Except as specified below, install concealed gas piping in airtight conduit constructed of Schedule 40, seamless, black steel pipe with welded joints. Vent conduit to outside and terminate with screened vent cap.

1. Above-Ceiling Locations: Gas piping may be installed in accessible spaces, subject to approval of authorities having jurisdiction, whether or not such spaces are used as plenums. Do not locate valves above ceilings.
2. In Partitions: Do not install concealed piping in solid partitions. Protect tubing from physical damage when installed inside partitions or hollow walls.
3. In Walls: Gas piping with welded joints and protective wrapping specified in Part 2 "Protective Coating" Article may be installed in masonry walls, subject to approval of authorities having jurisdiction.
4. Prohibited Locations: Do not install gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), or ventilating ducts.

E. Drips and Sediment Traps: Install drips at points where condensate may collect. Include outlets of service meters. Locate where readily accessible for cleaning and emptying. Do not install where condensate would be subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use minimum-length nipple of 3 pipe diameters, but not less than 3 inches long, and same size as connected pipe. Install with space between bottom of drip and floor for removal of plug or cap.

F. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings unless specifically shown to be exposed to view.

- G. Install fuel gas piping at uniform grade of 0.1 percent slope upward toward risers.
- H. Install piping adjacent to appliances to allow service and maintenance. Connect piping to appliances using gas with shutoff valves and unions. Install valve upstream from and within 72 inches of each appliance. Install union downstream from valve.

3.05 FIELD QUALITY CONTROL

A. TESTING

1. After completion of work, and before backfilling, if required, the entire system shall be tested to an air pressure of 125 PSI for a period of two hours and proved tight by inspection. Furnish results of the tests, signed by the Contractor, to the Architect-Engineer.
2. Test, inspect, and purge piping according to NFPA 54 and requirements of authorities having jurisdiction. Repair leaks and defects with new materials and retest system until satisfactory results are obtained.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK - NOT USED

PART 4 SCHEDULES - NOT USED

END OF SECTION

PLUMBING DOMESTIC WATER 22 11 16

PART 1 GENERAL

1.01 SUMMARY

A. GENERAL DESCRIPTION

1. The domestic water system shall consist of all hot and cold-water piping required for each fixture or equipment item, needing same, installed or connected under this contract from a point 5'-0" outside of the building unless otherwise indicated.

- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. ASTM B-88
- B. ASA B16.22
- C. AWWA Class 150
- D. ASTM B813
- E. ASTM B32
- F. CDA
- G. ASTM B828
- H. ASTM F2014

1.03 SUBMITTALS

A. PRODUCT DATA

1. Submit brochures and other data for approval of all items specified.

B. SHOP DRAWINGS – NOT USED

1.04 QUALITY ASSURANCE

A. QUALIFICATIONS

1. This system shall be installed in accordance with State and Local Codes, these Specifications and the Drawings. Contractor shall call to the attention of the Architect-Engineer any changes required by codes that will affect the design of the building.
2. Solder and flux shall not contain more than 0.2% lead. Potable-water piping and components shall comply with NSF 61 and NSF 372.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK – As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE

- A. Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS/EQUIPMENT

A. PIPE

1. Above Ground: Type L Copper, hard-drawn and conforming to ASTM B-88, with wrought copper fittings conforming to ASME B16.22, cast bronze conforming to ASA B16.18, or copper pressure-seal-joint fittings conforming to ASME B16.51.
2. Under Ground: Type K Copper, soft-drawn. All piping 2" and smaller shall be looped with soft copper with no joints beneath slab. All piping larger than 2" shall have SIL-FOS brazed joints.
3. Underground water main larger than 2" located outside building or as indicated shall be AWWA Class 150 Cement-lined mechanical joint ductile iron pipe. Refer to Division 33, Section "Water Distribution System" for water meter.

B. FITTINGS: Wrought Copper.

2.02 FINISHES - NOT USED

2.03 ACCESSORIES - NOT USED

2.04 FABRICATION - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements.
- B. Visit the proposed construction site and investigate all existing utilities and working conditions to be encountered prior to bidding.
- C. Before commencing any work, verify invert elevations required for the proper connection to the existing domestic water services and cover to avoid freezing.

3.02 DELIVERY, STORAGE, AND HANDLING - NOT USED

3.03 PREPARATION

A. JOB CONDITIONS - NOT USED

B. SURFACE PREPARATIONS

1. All piping underground, which is not insulated, shall be coated to a thickness of 1/16" with Pittcote 300 or use optional insulating tape.

3.04 CONSTRUCTION

A. INSTALLATION

1. GENERAL

- a. Basic piping installation requirements are specified in Division 22 Section "Basic Piping."
- b. Install under-building –slab copper tubing according to CDA's "Copper Tube Handbook."
- c. Install shutoff valve, hose-end drain valve, strainer, pressure gauge, and test tee with valve, inside the building at each domestic water service.
- d. Install domestic water piping level with 0.25 percent slope downward toward drain and

plumb.

- e. Provide service ball valves in the hot and cold water at each fixture group, major equipment, and water heaters.
- f. At end of runouts to each individual fixture or fixture group, provide full-sized air chamber on cold and hot water lines. Provide drains at low points in the system.
- g. All water heaters and storage tanks shall have properly sized temperature and pressure relief valves, piped to within 6" of floor.

2. JOINT CONSTRUCTION

- a. Basic piping joint construction requirements are specified in Division 22 - "Basic Piping."
- b. Soldered Joints: Use ASTM B813, water-flushable, lead-free flux; ASTM B32, lead-free-alloy solder; and ASTM B828 procedure, unless otherwise indicated.

3. CONNECTIONS

- a. Install piping adjacent to equipment and machines to allow service and maintenance.
- b. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
 - i) Water Heaters: Cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
 - ii) Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Plumbing Fixtures."
 - iii) Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.05 FIELD QUALITY CONTROL

- A. Test water system with water to a pressure of 125 PSI for a period of two hours. Prove tight by maintaining pressure without adding water. Notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests in presence of authorities having jurisdiction to ensure compliance with requirements. Results of the tests, signed by the Contractor and authorities having jurisdiction, shall be furnished to the Architect-Engineer.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. Avoid installing piping in outside walls; when unavoidable, insulate the pipe, and install the piping between the wall insulation and the inside finished surface.
- B. Disinfect potable water piping by filling with a solution containing 50 parts per million of available chlorine or as required by code authority. This solution shall be allowed to stand six hours. Flush all piping and equipment.

PART 4 SCHEDULES - NOT USED

END OF SECTION

PLUMBING DOMESTIC WATER PIPING SPECIALTIES 22 11 19

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: This Section includes the following domestic water piping specialties:
 - 1. Vacuum breakers.
 - 2. Backflow preventers.
 - 3. Circuit Setters.
 - 4. Primary, Thermostatic, water mixing valves.
 - 5. Strainers.
 - 6. Wall hydrants.
 - 7. Drain valves.
 - 8. Water hammer arresters.
 - 9. Trap-seal primer valves.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. FDA
- B. ASSE 1001
- C. ASSE 1013
- D. ASSE 1017
- E. ASME A 112.1.2
- F. ASME A 112.21.3M
- G. ASME B 1.20.7
- H. MSS SP-110
- I. AWWA C550

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.
- C. Operation and maintenance data.

1.04 QUALITY ASSURANCE

- A. NSF Compliance: Comply with NSF 61 and NSF 372.

1.05 SYSTEM DESCRIPTION: Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 VACUUM BREAKER

- A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:
 - 1. Standard: ASSE 1001.
 - 2. Size: NPS 1/4 to NPS 3, as required to match connected piping.
 - 3. Body: Bronze.
 - 4. Inlet and Outlet Connections: Threaded.
 - 5. Finish: Rough bronze.
 - 6. MANUFACTURERS: Subject to compliance with requirements, provide products by one of the following:
 - a. Conbraco Industries, Inc.
 - b. Watts Industries, Inc.; Water Products Div.
 - c. Zurn Plumbing Products Group; Wilkins Div.
- B. Hose-Connection Vacuum Breakers:
 - 1. Standard: ASSE 1001.
 - 2. Body: Bronze, nonremovable, with manual drain.
 - 3. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
 - 4. Finish: Nickel plated.
 - 5. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Conbraco Industries, Inc.
 - b. MIFAB, Inc.
 - c. Watts Industries, Inc.; Water Products Div.
 - d. Zurn Plumbing Products Group; Wilkins Div.
- C. Reduced-Pressure-Principle Backflow Preventers:
 - 1. Standard: ASSE 1013.
 - 2. Operation: Continuous-pressure applications.
 - 3. Pressure Loss: 12 psig maximum, through middle 1/3 of flow range.
 - 4. Size: See drawings.
 - 5. Design Flow Rate: See drawings.
 - 6. Selected Unit Flow Range Limits: 400.
 - 7. Pressure Loss at Design Flow Rate: 12 for NPS 2-1/2 and larger.
 - 8. Body: Epoxy coated; cast iron with epoxy coated interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and larger.
 - 9. End Connections: Flanged for NPS 2-1/2 and larger.
 - 10. Configuration: Designed for horizontal, straight through flow.
 - 11. Accessories:
 - a. Valves: Ball type with threaded ends on inlet and outlet of NPS 2-1/2 and smaller; outside screw and yoke gate-type with flanged ends on inlet and outlet of NPS 3 and larger.
 - b. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

12. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ames Co.
 - b. Conbraco Industries, Inc.
 - c. Watts Industries, Inc.; Water Products Div.
 - d. Zurn Plumbing Products Group; Wilkins Div.
- D. Primary, Thermostatic, Water Mixing Valves
 1. Available Manufacturers: Subject to Compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to the following:
 - a. Armstrong International, Inc.
 - b. Lawler Manufacturing Company, Inc.
 - c. Leonard Valve Company
 - d. Power; a Watts Industries Co.
 - e. Symmons Industries, Inc.
 2. Standard ASSE 1017
 3. Pressure Rating: 125 psig.
 4. Type: Exposed-mounting, Thermostatically controlled water mixing valve.
 5. Material: Bronze body with corrosion resistant interior components.
 6. Connections: Union inlets and outlet.
 7. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature control handle.
 8. Valve pressure rating: 125 psig minimum, unless otherwise indicated.
 9. Tempered-Water setting: 105°F for Housing and Admin, 140°F for Kitchen, 160°F for Laundry.
 10. Valve Finish: Rough Bronze
 11. Piping Finish: Copper
- E. Nonfreeze Wall Hydrants: (NFWH)
 1. Standard: ASME A112.21.3M for concealed-outlet, self-draining wall hydrants.
 2. Pressure Rating: 125 psig.
 3. Operation: Loose key.
 4. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
 5. Inlet: NPS 3/4 or NPS 1.
 6. Outlet: Concealed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
 7. Box: Deep, flush mounting with cover.
 8. Box and Cover Finish: Polished nickel bronze.
 9. Outlet: Exposed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
 10. Nozzle and Wall-Plate Finish: Polished nickel bronze.
 11. Operating Keys(s): One with each wall hydrant.

12. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company.
 - b. MIFAB, Inc.
 - c. Prier Products, Inc.
 - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - e. Tyler Pipe; Wade Div.
 - f. Watts Drainage Products Inc.
 - g. Woodford Manufacturing Company.
 - h. Zurn Plumbing Products Group; Specification Drainage Operation.
- F. Ball-Valve-Type, Hose-End Drain Valves:
 1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
 2. Pressure Rating: 400-psig minimum CWP.
 3. Size: NPS 3/4.
 4. Body: Copper alloy.
 5. Ball: Chrome-plated brass.
 6. Seats and Seals: Replaceable.
 7. Handle: Vinyl-covered steel.
 8. Inlet: Threaded or solder joint.
 9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.
- G. Water Hammer Arresters:
 1. Standard: ASSE 1010 or PDI-WH 201.
 2. Type: Copper tube with piston.
 3. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.
 4. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AMTROL, Inc.
 - b. Josam Company.
 - c. MIFAB, Inc.
 - d. PPP Inc.
 - e. Sioux Chief Manufacturing Company, Inc.
 - f. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - g. Tyler Pipe; Wade Div.
 - h. Watts Drainage Products Inc.
 - i. Zurn Plumbing Products Group; Specification Drainage Operation.
- H. Supply-Type, Trap-Seal Primer Valves:
 1. Standard: ASSE 1018.
 2. Pressure Rating: 125 psig minimum.
 3. Body: Bronze.
 4. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
 5. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.

6. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.
7. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. MIFAB, Inc.
 - b. PPP Inc.
 - c. Sioux Chief Manufacturing Company, Inc.
 - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - e. Watts Industries, Inc.; Water Products Div.
 - f. Zurn.

2.02 FINISHES: See individual product descriptions.

2.03 ACCESSORIES - NOT USED

2.04 FABRICATION - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING – NOT USED

3.03 PREPARATION – NOT USED

3.04 CONSTRUCTION

A. Refer to Div 22 - Basic Piping for piping joining materials, joint construction, and basic installation requirements.

B. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.

1. Locate backflow preventers in same room as connected equipment or system.

2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.

3. Do not install bypass piping around backflow preventers.

C. Install water regulators with inlet and outlet shutoff valves and bypass with memory-stop balancing valve. Install pressure gauges on inlet and outlet.

D. Install balancing valves in locations where they can easily be adjusted.

E. Install temperature-actuated water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.

F. Install Y-pattern strainers for water on supply side of each backflow preventer.

G. Install water hammer arresters in water piping according to PDI-WH 201.

H. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

I. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.

- J. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
 - 1. Reduced-pressure-principle backflow preventers.
 - 2. Primary, thermostatic, water mixing valves.
 - 3. Supply-type, trap-seal primer valves.
- K. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit.

3.05 FIELD QUALITY CONTROL

- A. Perform the following tests and prepare test reports:
 - 1. Test each reduced-pressure-principle backflow preventer assembly according to authorities having jurisdiction and the device's reference standard.
- B. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

3.06 ADJUSTING, CLEANING AND PROTECTION OF WORK

- A. Set field-adjustable pressure set points of water pressure-reducing valves.
- B. Set field-adjustable flow of balancing valves.
- C. Set field-adjustable temperature set points of temperature-actuated water mixing valves.

PART 4 SCHEDULES – NOT USED

END OF SECTION

PLUMBING SOIL AND WASTE 22 13 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: The soil and waste system shall consist of all sanitary waste and vent piping required for each fixture, drain or equipment installed or connected under this contract from a point 5'-0" outside of the building unless otherwise indicated.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Condition, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. ASTM B32
- B. ASTM B813
- C. ASTM B828
- D. ASTM D2321
- E. ASTM D2665
- F. ASTM D3311

1.03 SUBMITTALS – NOT USED

1.04 QUALITY ASSURANCE

- A. This system shall be installed in accordance with State and Local Codes, these Specifications and the Drawings. Contractor shall call to the attention of the Architect/Engineer any changes required by codes that will change the design of the building.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK – As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE

- A. Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS/EQUIPMENT

- A. SANITARY WASTE AND VENT, RAIN LEADER, AND AIR CONDITIONING UNIT, REFRIGERATOR AND FREEZER CONDENSATE DRAINS
 - 1. PVC Pipe: ASTM D2665, solid-wall drain, waste, and vent
 - a. PVC Socket Fittings: ASTM D2665, Socket type, made to ASTM D3311, drain, waste and vent patterns.
 - 2. PVC-DWV may be used where allowed by code and when pipe is not located in ceiling return plenums. PVC shall not be used where service temperature is 140°F and higher (kitchens, laundries, etc.). Assemble with solvent weld joints.
 - 3. For drain and waste piping where service temperature is 140°F or higher, cast iron piping with no-hub fittings shall be used aboveground and hub and spigot cast iron piping shall be used underground.
 - 4. Plumbing vent roof flashing shall be 4 lb. sheet lead.
- B. CLEANOUTS:

1. Where installed in exposed cast iron pipe, cleanouts shall consist of raised-head cast brass plug with caulking ferrule. Where installed in tapped drainage fittings, cleanouts shall be cast brass raised-head plug.
2. Cleanouts in walls shall consist of raised solid head, cast brass plug with stainless steel cover.
3. Where installed in floors, cleanouts shall consist of cast iron ferrule, brass plug, adjustable cast iron housing and nickel brass scoriated cover and matching flange for flush mounting. Cleanouts in tile floor shall have recessed cover.
4. For installation in exterior piping, cleanouts flush with finish grade shall consist of cast iron adjustable head, seriated cutoff ferrule, brass raised head internal plug, heavy scoriated cover.
5. Cleanouts are not allowed above ceiling if space is used as an air plenum.

2.02 FINISHES - NOT USED

2.03 ACCESSORIES - NOT USED

2.04 FABRICATION - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements.

3.02 DELIVERY, STORAGE, AND HANDLING - NOT USED

3.03 PREPARATION - NOT USED

3.04 CONSTRUCTION

A. CONSTRUCTION - GENERAL

1. Cleanouts shall be located as required by State and Local Codes and as indicated on the Drawings. Cleanouts shall occur at intervals of not more than 75'- 0" or as indicated. Cleanouts shall be brought to an accessible location, flush with grade or floor, and terminated with fitting equal to that specified elsewhere.
2. Single or double sanitary tees or quarter bends may be used only where the change is from horizontal to vertical, and only above slab.
3. Condensate drains for air conditioning units shall include traps sufficiently deep to seal airflow. Drain lines less than 2" in size shall have cleanouts on minimum 20'- 0" centers and in each change in direction of flow. Otherwise, provide cleanouts per code.
4. Special pipe fittings with pressure ratings at least equal to piping pressure ratings may be used in applications below, unless otherwise indicated.
5. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.
6. Aboveground, soil, waste and vent piping NPS 4 and smaller shall be any of the following:
 - a. Copper DWV tube, copper drainage fittings, and soldered joints.
 - b. Schedule 40 PVC pipe, PVC socket fittings and solvent-cemented joints.
7. Underground, soil, waste, and vent piping NPS 4 and smaller shall be any of the following:
 - a. Schedule 40 PVC pipe, PVC socket fittings, and solvent-cemented joints.
8. Underground, soil and waste piping NPS 5 and larger shall be any of the following:

- a. Schedule 40 PVC pipe, PVC socket fittings and solvent-cemented joints.

B. PIPING INSTALLATION

1. Sanitary sewer piping outside the building is specified in Div 33 – Sanitary Sewer Systems.
2. Basic piping installation requirements are specified in Div 22 – Basic Piping.
3. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.
4. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
5. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
6. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
 - a. Building Sanitary Drain and Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow for piping NPS 2 and smaller; 1 percent downward in direction of flow for piping NPS 3 and larger.
 - b. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
7. Install PVC soil and waste drainage and vent piping according to ASTM D2665.
8. Install underground PVC soil and waste drainage piping according to ASTM D2321.
9. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

C. JOINT CONSTRUCTION

1. Basic piping joint construction requirements are specified in Div 22 - Basic Piping.
2. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated. PVC Non-Pressure Piping Joints: Join piping according to ASTM D2665.

D. CONNECTIONS

1. Connect soil and waste piping to exterior sanitary sewer piping. Use transition fitting to join dissimilar piping materials.
2. Connect drainage and vent piping to the following:
 - a. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code. Refer to Div 22 - Plumbing Fixtures.
 - b. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
 - c. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
 - d. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-

1/2 and larger.

3.05 FIELD QUALITY CONTROL

- A. Entire waste and vent system shall be tested to a minimum head of 10'-0" hydrostatic head. This pressure shall be maintained a minimum of three hours and proved tight. Results of the test, signed by the Contractor, shall be furnished to Architect-Engineer.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

PART 4 SCHEDULES - NOT USED

END OF SECTION

PLUMBING DRAINAGE PIPING SPECIALTIES 22 13 19

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: This Section includes the following drainage piping specialties:
 - 1. Cleanouts.
 - 2. Floor drains.
 - 3. Roof flashing assemblies.
 - 4. Miscellaneous drainage piping specialties.
 - 5. Flashing materials.
 - 6. Condensate drains.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. ASME A 112.1.2
- B. ASME A 112.6.3
- C. ASME A 112.14.1
- D. ASME A 112.36.2M
- E. ASTM A74
- F. ASTM B32
- G. ASTM B749
- H. ASTM C564
- I. SSPC – Paint 12

1.03 SUBMITTALS

- A. PRODUCT DATA: For each type of product specified. Include rated capacities, operating characteristics, and accessories for grease interceptors and laundry interceptors.

1.04 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

1.05 SYSTEM DESCRIPTION – NOT USED

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cast-Iron Floor Cleanouts (FCO):
 - 1. Standard: ASME A112.36.2M for adjustable housing PVC soil pipe with cast-iron ferrule threaded, adjustable housing cleanout.
 - 2. Size: Same as connected branch.

3. Type: Cast-iron soil pipe with cast-iron ferrule Threaded, adjustable housing.
 4. Body or Ferrule: Cast iron.
 5. Clamping Device: Not required.
 6. Outlet Connection: Inside calk Spigot.
 7. Closure: Brass plug with straight threads and gasket.
 8. Adjustable Housing Material: Cast iron with set-screws.
 9. Frame and Cover Material and Finish: Polished bronze.
 10. Frame and Cover Shape: Round.
 11. Top Loading Classification: Medium Duty.
 12. Riser: ASTM A 74, Service class, PVC drainage pipe fitting and riser to clean-out.
 13. All cleanouts in secured housing areas shall have center pin vandal resistant screws.
 14. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company; Josam Div.
 - b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - c. Watts Drainage Products Inc.
 - d. Zurn Plumbing Products Group; Specification Drainage Operation.
- B. PVC Wall Cleanouts (WCO):
1. Standard: ASME A112.36.2M. Include wall access.
 2. Size: Same as connected drainage piping.
 3. Body: PVC soil pipe test tee as required to match connected piping.
 4. Closure: Countersunk or raised-head, drilled-and-threaded PVC plug.
 5. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
 6. Wall Access: Round, stainless-steel cover plate with screw.
 7. Wall Access: Round, stainless-steel wall-installation frame and cover.
 8. All cleanouts in secured areas shall have center pin vandal resistant screws.
 9. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company; Josam Div.
 - b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - c. Watts Drainage Products Inc.
 - d. Zurn Plumbing Products Group; Specification Drainage Operation.
- C. Cast-Iron Floor Drains (FD):
1. Standard: ASME A112.6.3.
 2. Pattern: Floor Sanitary drain.
 3. Body Material: Gray iron.
 4. Seepage Flange: Required on all drains above ground floor.
 5. Anchor Flange: Required.
 6. Clamping Device: Required.
 7. Outlet: Bottom.

8. Coating on Interior and Exposed Exterior Surfaces: Not required unless noted otherwise.
9. Sediment Bucket: Not required unless noted otherwise.
10. Top or Strainer Material: Nickel bronze.
11. Top of Body and Strainer Finish: Nickel bronze.
12. Top Shape: Round or Square. (Provide square top for tile floors)
13. Dimensions of Top or Strainer: Indicated on drawings.
14. Top Loading Classification: Heavy Duty.
15. Funnel: Not required unless noted otherwise.
16. Inlet Fitting: Gray iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
17. Trap Material: Cast iron.
18. Trap Pattern: Deep-seal P-trap.
19. Trap Features: Trap-seal primer valve drain connection.
20. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company; Josam Div.
 - b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - c. Watts Drainage Products Inc.
 - d. Zurn Plumbing Products Group; Specification Drainage Operation.

D. Roof Flashing Assemblies:

1. Description: Manufactured assembly made of 4.0-lb/sq. ft., 0.0625-inch-thick, lead flashing collar and skirt extending at least 8 inches from pipe, with galvanized-steel boot reinforcement and counterflashing fitting.
 - a. Open-Top Vent Cap: Without cap.
 - b. Low-Silhouette Vent Cap: With vandal-proof vent cap.
 - c. Extended Vent Cap: With field-installed, vandal-proof vent cap.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Acorn Engineering Company; Elmdor/Stoneman Div.
 - b. Thaler Metal Industries Ltd.

2.02 FINISHES – NOT USED

2.03 ACCESSORIES

A. Open Drains: (HD-1):

1. Description: Shop or field fabricate from ASTM A 74, PVC, soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting joined with ASTM C 564, rubber gaskets.
2. Size: Same as connected waste piping with increaser fitting of size indicated.

B. Deep-Seal Traps:

1. Description: PVC, with inlet and outlet matching connected piping and cleanout trap-seal primer valve connection.
2. Size: Same as connected waste piping.
 - a. NPS 2: 4-inch minimum water seal.

- b. NPS 2-1/2 and Larger: 5-inch minimum water seal.
- C. Floor-Drain, Trap-Seal Primer Fittings:
 - 1. Description: Cast iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
 - 2. Size: Same as floor drain outlet with NPS 1/2 side inlet.
- D. Air-Gap Fittings:
 - 1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.
 - 2. Body: Bronze or cast iron.
 - 3. Inlet: Opening in top of body.
 - 4. Outlet: Larger than inlet.
 - 5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.
- E. Sleeve Flashing Device:
 - 1. Description: Manufactured, cast-iron fitting, with clamping device, that forms sleeve for pipe floor penetrations of floor membrane. Include galvanized-steel pipe extension in top of fitting that will extend 2 inches above finished floor and galvanized-steel pipe extension in bottom of fitting that will extend through floor slab.
 - 2. Size: As required for close fit to riser or stack piping.
- F. Stack Flashing Fittings:
 - 1. Description: Counterflashing-type, PVC fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
 - 2. Size: Same as connected stack vent or vent stack.
- G. Vent Caps:
 - 1. Description: PVC body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
 - 2. Size: Same as connected stack vent or vent stack.
- H. Flashing Materials:
 - 1. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:
 - a. General Use: 4.0-lb/sq. ft., 0.0625-inch thickness.
 - b. Vent Pipe Flashing: 3.0-lb/sq. ft., 0.0469-inch thickness.
 - c. Burning: 6-lb/sq. ft., 0.0938-inch thickness.
 - 2. Fasteners: Metal compatible with material and substrate being fastened.
 - 3. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
 - 4. Solder: ASTM B 32, lead-free alloy.
 - 5. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.
- I. Condensate Drains:
 - 1. Condensate drain piping shall be type L drawn-temper copper tubing with soldered joints or Schedule 40 PVC pipe with solvent welded joints. PVC shall not be utilized in areas subject to damage such as mechanical rooms.

2.04 FABRICATION – NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING – NOT USED

3.03 PREPARATION – NOT USED

3.04 CONSTRUCTION

- A. Refer to Section 22 11 00 Plumbing Basic Piping for piping joining materials, joint construction, and basic installation requirements.
- B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
 - 1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
 - 2. Locate at each change in direction of piping greater than 45 degrees.
 - 3. Locate at minimum intervals of 50 feet for piping NPS 3 and smaller and 100 feet for larger piping.
 - 4. Locate at base of each vertical soil and waste stack.
- C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated. Coordinate with Architectural drawings and details for exact location of floor drains.
 - 1. Position floor drains for easy access and maintenance.
 - 2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
 - a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
 - b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
 - c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
 - 3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
 - 4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- F. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.
- G. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.
- H. Assemble open drain fittings and install with top of hub 1 inch above floor.
- I. Install deep-seal traps on floor drains and other waste outlets, if indicated.

- J. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.
 - 1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
 - 2. Size: Same as floor drain inlet.
- K. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.
- L. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.
- M. Install vent caps on each vent pipe passing through roof..
- N. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.
- O. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.
- P. CONNECTIONS
 - 1. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
 - 2. Install piping adjacent to equipment to allow service and maintenance.
- Q. FLASHING INSTALLATION
 - 1. Coordinate this Article with Section 07 62 00 Flashing and Sheet Metal.
 - 2. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
 - a. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft., 0.0938-inch thickness or thicker. Solder joints of lead sheets 4.0-lb/sq. ft., 0.0625-inch thickness or thinner.
 - 3. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
 - a. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
 - b. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
 - c. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.
 - 4. Set flashing on floors and roofs in solid coating of bituminous cement.
 - 5. Secure flashing into sleeve and specialty clamping ring or device.
 - 6. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings, according to Section 07 62 00 Flashing and Sheet Metal.
 - 7. Extend flashing up vent pipe passing through roofs and turn down into pipe.
- R. LABELING AND IDENTIFYING
 - 1. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each grease interceptor.
 - 2. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 22 05 53 Plumbing Identification.

3.05 FIELD QUALITY CONTROL – NOT USED

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

PART 4 SCHEDULES – NOT USED

END OF SECTION

PLUMBING FIXTURES 22 42 00

PART 1 GENERAL

1.01 SUMMARY

A. GENERAL DESCRIPTION: This Section includes the following:

1. Faucets for lavatories and sinks.
2. Flushometers.
3. Toilet seats.
4. Protective shielding guards.
5. Fixture supports.
6. Water closets and urinals.
7. Lavatories.
8. Service sinks.

B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division

1.02 REFERENCES – NOT USED

1.03 SUBMITTALS

- A. PRODUCT DATA: For each type of product indicated.
- B. SHOP DRAWINGS: Diagram power, signal, and control wiring.
- C. Operation and maintenance data.

1.04 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.
- C. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
- D. NSF Standard: Comply with NSF 61 and NSF 372 for fixture materials that will be in contact with potable water.
- E. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.
- F. Comply with the following applicable standards and other requirements specified for plumbing fixtures:
 1. Enameled, Cast-Iron Fixtures: ASME A112.19.1M.
 2. Plastic Laundry Trays: ANSI Z124.6.
 3. Porcelain-Enameled, Formed-Steel Fixtures: ASME A112.19.4M.
 4. Solid-Surface-Material Lavatories and Sinks: ANSI/ICPA SS-1.
 5. Stainless-Steel Commercial Sinks: ASME A112.19.3.

6. Vitreous-China Fixtures: ASME A112.19.2M.
 7. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.
 8. Water-Closet, Flushometer Tank Trim: ASSE 1037.
- G. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:
1. Backflow Protection Devices for Faucets with Side Spray: ASME A112.18.3M.
 2. Backflow Protection Devices for Faucets with Hose-Thread Outlet: ASME A112.18.3M.
 3. Diverter Valves for Faucets with Hose Spray: ASSE 1025.
 4. Faucets: ASME A112.18.1.
 5. Hose-Connection Vacuum Breakers: ASSE 1011.
 6. Hose-Coupling Threads: ASME B1.20.7.
 7. Integral, Atmospheric Vacuum Breakers: ASSE 1001.
 8. NSF Potable-Water Materials: NSF 61.
 9. Pipe Threads: ASME B1.20.1.
 10. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
 11. Supply Fittings: ASME A112.18.1.
 12. Brass Waste Fittings: ASME A112.18.2.
- H. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:
1. Atmospheric Vacuum Breakers: ASSE 1001.
 2. Brass and Copper Supplies: ASME A112.18.1.
 3. Manual-Operation Flushometers: ASSE 1037.
 4. Plastic Tubular Fittings: ASTM F 409.
 5. Brass Waste Fittings: ASME A112.18.2.
 6. Sensor-Operation Flushometers: ASSE 1037 and UL 1951.
- I. Comply with the following applicable standards and other requirements specified for miscellaneous components:
1. Flexible Water Connectors: ASME A112.18.6.
 2. Grab Bars: ASTM F 446.
 3. Hose-Coupling Threads: ASME B1.20.7.
 4. Hot-Water Dispensers: ASSE 1023 and UL 499.
 5. Off-Floor Fixture Supports: ASME A112.6.1M.
 6. Pipe Threads: ASME B1.20.1.
 7. Plastic Toilet Seats: ANSI Z124.5.
 8. Supply and Drain Protective Shielding Guards: ICC A117.1.
- 1.05 SYSTEM DESCRIPTION – NOT USED
- 1.06 OWNER'S INSTRUCTION AND MAINTENANCE- Refer to Div 01 for the General Requirements for Contract Close-out.

1.07 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.
- C. FRP: Fiberglass-reinforced plastic.
- D. PMMA: Polymethyl methacrylate (acrylic) plastic.
- E. PVC: Polyvinyl chloride plastic.
- F. Solid Surface: Nonporous, homogeneous, cast-polymer-plastic material with heat-, impact-, scratch-, and stain-resistance qualities.

PART 2 PRODUCTS

2.01 MATERIALS / EQUIPMENT: See fixture schedule on drawings for additional plumbing fixture and trim specifications.

A. Lavatory Faucets:

- 1. Description: Single-control mixing valve. Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.
- 2. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. American Standard Companies, Inc.
 - b. Chicago Faucets.
 - c. Delta Faucet Company.
 - d. Kohler Co.
 - e. Moen, Inc.
 - f. Speakman Company.
 - g. T & S Brass and Bronze Works, Inc.
 - h. Zurn Plumbing Products Group; Commercial Brass Operation.

B. Sink Faucets:

- 1. Description: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.
- 2. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. American Standard Companies, Inc.
 - b. Bradley Corporation.
 - c. Chicago Faucets.
 - d. Delta Faucet Company.
 - e. Kohler Co.
 - f. Moen, Inc.
 - g. Speakman Company.
 - h. T & S Brass and Bronze Works, Inc.
 - i. Zurn Plumbing Products Group; Commercial Brass Operation.

C. Flushometers:

- 1. Description: Include brass body with corrosion-resistant internal components, non-hold-open feature, control stop with check valve, vacuum breaker, copper or brass tubing, and polished chrome-plated finish on exposed parts.

2. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Coyne & Delany Co.
 - b. Sloan Valve Company.
 - c. Zurn Plumbing Products Group; Commercial Brass Operation.
- D. Toilet Seats:
1. Description: Toilet seat for water-closet-type fixture.
 2. Toilet Seat for all security fixtures shall be integral type.
 3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Bemis Manufacturing Company.
 - b. Centoco Manufacturing Corp.
 - c. Church Seats.
- E. Protective Shielding Pipe Covers:
1. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.
 2. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Engineered Brass Co.
 - b. McGuire Manufacturing Co., Inc.
 - c. TRUEBRO, Inc.
 - d. Zurn Plumbing Products Group; Tubular Brass Plumbing Products Operation.
- F. Fixture Supports
1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Josam Company.
 - b. MIFAB Manufacturing Inc.
 - c. Smith, Jay R. Mfg. Co.
 - d. Tyler Pipe; Wade Div.
 - e. Watts Drainage Products Inc.; a div. of Watts Industries, Inc.
 - f. Zurn Plumbing Products Group; Specification Drainage Operation.
- G. Water Closets and Urinals
1. Description: Vitreous-china fixture designed for flushometer valve operation.
 2. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. American Standard Companies, Inc.
 - b. Crane Plumbing, L.L.C./Fiat Products.
 - c. Kohler Co.
 - d. TOTO USA, Inc.
- H. Lavatories:
1. Description: Accessible, Wall-mounting, vitreous-china fixture.
 2. Drain Piping: NPS 1-1/4 chrome-plated, cast-brass P-trap.
 3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

- a. American Standard Companies, Inc.
 - b. Kohler Co.
 - c. Crane Plumbing, L.L.C./Fiat Products.
- I. Service Sinks:
- 1. Description: See drawings for Service Sink requirements.
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. American Standard Companies, Inc.
 - b. Stern Williams
 - c. Kohler Co.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING – NOT USED

3.03 PREPARATION – NOT USED

3.04 CONSTRUCTION

- A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
 - 1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
 - 2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
 - 3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
- C. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
- D. Install wall-mounting fixtures with tubular waste piping attached to supports.
- E. Install fixtures level and plumb according to roughing-in drawings.
- F. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
- G. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- H. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.
- I. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
- J. Install toilet seats on water closets.
- K. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- L. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.

- M. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- N. Install traps on fixture outlets.
 - 1. Exception: Omit trap on fixtures with integral traps.
- O. Install escutcheons at piping wall and ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Section 22 11 00 Plumbing Basic Piping.
- P. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Section 07 91 00 Joint Sealers.
- Q. CONNECTIONS
 - 1. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
 - 2. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
 - 3. Ground equipment according to Division 26 - "Electrical Grounding and Bonding."
 - 4. Connect wiring according to Division 26 - "Electrical Conductors and Cables."

3.05 FIELD QUALITY CONTROL

- A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.
- B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
- C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.
- D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

3.06 ADJUSTING, CLEANING AND PROTECTION OF WORK

- A. Provide protective covering for installed fixtures and fittings.
- B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

PART 4 SCHEDULES – NOT USED

END OF SECTION

PLUMBING WATER COOLERS 22 47 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: This Section includes the following:
 - 1. Style W, wall-mounting water coolers.
 - 2. Type PB, pressure with bubbler.
 - 3. Fixture carrier supports.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for fixtures for people with disabilities.
- B. NSF Standard: Comply with NSF 61 and NSF 372 for fixture materials that will be in contact with potable water.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. ARI Standard: Comply with ARI's "Directory of Certified Drinking Water Coolers" for style classifications.
- E. ARI Standard: Comply with ARI 1010, "Self-Contained, Mechanically Refrigerated Drinking-Water Coolers," for water coolers and with ARI's "Directory of Certified Drinking Water Coolers" for type and style classifications.
- F. ASHRAE Standard: Comply with ASHRAE 34, "Designation and Safety Classification of Refrigerants" for water coolers. Provide HFC 134a (tetrafluoroethane) refrigerant unless otherwise indicated.
- G. ASME A 112.18.1
- H. ASME 112.6.1M

1.03 SUBMITTALS

- A. PRODUCT DATA: For each type of product indicated.
- B. SHOP DRAWINGS: Diagram power, signal, and control wiring.
- C. Operation and maintenance data.

1.04 QUALITY ASSURANCE – NOT USED

1.05 SYSTEM DESCRIPTION – NOT USED

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

1.07 WARRANTY

- A. At project closeout, provide to Owner or Owner's representative an executed copy of the manufacturer's standard 5-year limited warranty on the refrigeration system of the unit. Also,

submit executed copy of manufacturer's standard one year warranty for electrical components and water system.

PART 2 PRODUCTS

2.01 MATERIALS / EQUIPMENT

A. Water Coolers:

1. Description: Subject to compliance with requirements, provide products compliant with the following requirements:
 - a. Cabinet: Single level ADA with vinyl-covered steel with stainless steel top.
 - b. Bubbler: One, with adjustable stream regulator.
 - c. Control: Push bar on front, left and right sides of each unit.
 - d. Supply: NPS 3/8 with ball, gate, or globe valve.
 - e. Filter: One or more water filters complying with NSF 42 and NSF 53 for cyst and lead reduction to below EPA standards; with capacity sized for unit peak flow rate.
 - f. Drain(s): Grid with NPS 1-1/4 minimum horizontal waste and trap complying with ASME A112.18.1.
 - g. Cooling System: Electric, with hermetically sealed compressor, cooling coil, air-cooled condensing unit, corrosion-resistant tubing, refrigerant, corrosion-resistant-metal storage tank, and adjustable thermostat.
 - i. Capacity: 8 gph of 50 deg F cooled water from 80 deg F inlet water and 90 deg F ambient air temperature.
 - ii. Electrical Characteristics: 115-V ac; single phase; 60 Hz.
 - h. Support: Type I, Type II. Refer to "Fixture Carrier Supports", Article 2.01, B.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Elkay Manufacturing Co.
 - b. Halsey Taylor.
 - c. Haws Corporation.
 - d. Oasis Corporation.
 - e. Sunroc Corp.

B. Fixture Carrier Supports

1. Description: ASME A112.6.1M, water cooler carriers. Include vertical, steel uprights with feet and tie rods and bearing plates with mounting studs matching fixture to be supported.
 - a. Type I: Hanger-type carrier with two vertical uprights.
 - b. Type II: Bilevel, hanger-type carrier with three vertical uprights.
 - c. Supports for Accessible Fixtures: Include steel rectangular or pipe vertical uprights.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. MIFAB Manufacturing, Inc.
 - b. Smith, Jay R. Mfg. Co.
 - c. Tyler Pipe/Wade Division.
 - d. Watts Drainage Products Inc.; a div. of Watts Industries, Inc.
 - e. Zurn Plumbing Products Group; Specification Drainage Operation.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING – NOT USED

3.03 PREPARATION – NOT USED

3.04 CONSTRUCTION

A. APPLICATIONS

1. Use carrier supports for wall-mounting fixtures, unless otherwise indicated.
2. Use chrome-plated brass or copper tube, fittings, and valves in locations exposed to view.

B. INSTALLATION

1. Install carrier supports affixed to building substrate and attach wall-mounting fixtures, unless otherwise indicated.
2. Install fixtures level and plumb. Install at height required by authorities having jurisdiction.
3. Install water-supply piping with shutoff valve on supply to each fixture to be connected to water distribution piping. Use ball, gate, or globe valve. Install valves in locations where they can be easily reached for operation.
4. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.
5. Install pipe escutcheons at wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding pipe fittings.
6. Seal joints between fixtures, walls and floors using sanitary-type, one part, mildew resistant silicone sealant. Match sealant color to fixture color.

C. CONNECTIONS

1. Connect fixtures with water supplies, traps, and risers, and with soil, waste, and vent piping. Use size fittings required to match fixtures.
2. Ground equipment according to Div 26 – Electrical Grounding and Bonding.
3. Connect wiring according to Div 26 – Electrical Conductors and Cables.

3.05 FIELD QUALITY CONTROL

A. Water Cooler Testing: After electrical circuitry has been energized, test for compliance with requirements. Test and adjust controls and safeties.

1. Remove and replace malfunctioning units and retest as specified above.
2. Report test results in writing.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. Adjust fixture flow regulators for proper flow and stream height.
- B. Adjust water cooler temperature settings.

PART 4 SCHEDULES – NOT USED

END OF SECTION

DIVISION - 23 HEATING, VENTILATING AND AIR-CONDITIONING

23 05 00 HVAC GENERAL

23 05 10 HVAC FIRESTOP SYSTEMS

23 05 29 HVAC SUPPORTING SYSTEMS

23 05 48 HVAC WIND RESTRAINTS

23 05 53 HVAC IDENTIFICATION

23 05 94 HVAC START-UP, TESTING, BALANCING AND ADJUSTING

23 07 00 HVAC SYSTEMS INSULATION

23 09 00 HVAC CONTROLS

23 11 00 HVAC BASIC PIPING

23 31 13 HVAC SHEET METAL

23 36 00 HVAC EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Heating, Ventilating and Air-Conditioning drawings are diagrammatic, due to scale, therefore, all offsets, fittings, valves and accessories are not shown. Plan work around building details and other trades. In case of interference between trades, Architect-Engineer will decide which work is to take precedence regardless of work that might be installed.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. Wherever applicable, work shall conform to the standards of:
 - 1. OSHA – Occupational Safety and Health Administration
 - 2. NFPA – National Fire Protection Association
 - 3. UL – Underwriters Laboratories
 - 4. ASTM – American Society for Testing and Materials
 - 5. ANSI – American National Standards Institute
 - 6. AGA – American Gas Association
 - 7. ASME – American Society of Mechanical Engineers
 - 8. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers
 - 9. SMACNA – Sheet Metal and Air-Conditioning Contractors' National Association
 - 10. ADA – American Disabilities Act
 - 11. ARI – American Refrigeration Institute
 - 12. AMCA – Air Moving and Conditioning Association
 - 13. NBS – National Bureau of Standards
 - 14. NSF – National Sanitation Foundation
 - 15. AWWA – American Water Works Association
 - 16. FM – Factory Mutual
 - 17. AABC – Associated Air Balance Council
 - 18. NEBB – National Environment Balancing Bureau

1.03 CODES, ORDINANCES, INSPECTIONS AND PERMITS

- A. Work is to be executed and inspected in accordance with local and state codes, laws, ordinances, rules and regulations applicable to particular class of work, and any fees in connection therewith are to be paid by Contractor.
- B. Should any part of Drawings or Specifications be found to be in conflict with applicable codes or ordinances, notify the Architect-Engineer, in writing, within 72 hours prior to receiving of bids. After the receiving of bids, any discovery of code violations shall be promptly reported to the Architect-Engineer. Any work performed knowingly in violation of codes shall be corrected without additional expense to the Owner or his representative.
- C. Arrange with County or State, if City has no ordinances covering work, for complete inspection, paying all charges pertaining thereto. Give proper authority all requisite notice relating to work under such; inform Architect-Engineer and all responsible for all violations of law. Upon completion of work, have work inspected, if required, obtaining certificate of inspection and approval from inspecting agency and deliver such certificate to the Architect-Engineer.
- D. All work shall be performed by an Arkansas licensed contractor.

1.04 SHOP DRAWINGS AND SUBMITTALS

A. PRODUCT DATA

- 1. Submit within 30 days after Notice to Proceed, manufacturer's catalog sheets and/or shop drawings covering all phases of work included in this contract.
- 2. Submittals shall be complete, arranged in sets, indexed and bound. No loose sheets or partial submittals will be acceptable. See Section 01 33 23 for requirements of submittal.
- 3. All submittals shall bear written certification to the effect that the Contractor has examined them and found them to be in accordance with specifications and to be dimensionally correct with reference to available space and to related trades.
- 4. Submittals are required even though equipment being furnished is exactly as specified.

B. SHOP DRAWINGS

- 1. The HVAC Contractor shall prepare and submit for approval coordination drawings for mechanical rooms, chases, and other high interference areas. The drawings shall include plumbing, electrical and other divisions of work as necessary to achieve coordination between the various divisions of work. See Section 23 31 13.
- 2. The HVAC Contractor shall obtain the necessary information from the other divisions of work as necessary to coordinate these trades with the HVAC.
- 3. The coordination drawings shall be drawn to minimum of quarter inch per foot scale, and shall show plan views, elevations and sections as needed to coordinate the work. Equipment rooms shall be drawn minimum one-half inch per foot scale.
- 4. The coordination drawings shall be submitted to the other divisions of work for approval prior to submission to the Architect/ Engineer. See section 01 33 23 for requirements of submittal.
- 5. Coordination drawings shall also be furnished to show approved deviations from the construction documents.

C. SUBSTITUTION OF MATERIALS

1. Final decision as to whether or not a specific piece of equipment meets specifications shall rest with Architect-Engineer.
2. Any proposed substitutions of equipment shall be accompanied by Shop Drawings showing revised equipment layouts, piping diagrams, structural modifications. Where substituted equipment furnished requires use of larger, more, or differently arranged connections, such connections shall be installed to the complete satisfaction of Architect-Engineer, without additional cost to Owner.
3. Should a substitution be accepted and subsequently proven unsatisfactory for the service intended within the warranty period, the contractor shall replace this material or equipment with that as originally specified, or corrected as directed by Architect-Engineer.

D. RECORD SET DRAWINGS

1. At completion of this project, the Contractor shall provide Architect-Engineer with an electronic copy (AutoCAD) on CD plus one hard copy of all drawings showing all work installed by him.
2. These drawings shall incorporate all changes made in the course of the project so as to enable the Owner to properly maintain, operate and repair both exposed and concealed work.

E. GUARANTY-WARRANTY

1. All materials and equipment shall carry a full year's warranty from time Owner accepts building or the date of substantial completion, whichever is earlier, regardless of start-up date of equipment, unless a longer warranty period is specified under other sections.

F. OPERATION AND MAINTENANCE MANUAL

1. The mechanical contractor shall provide to the building Owner an Operation and Maintenance (O&M) Manual that shall include at a minimum the following for compliance with the 2021 IECC.
 - a. The equipment capacity (input and output) and required maintenance actions.
 - b. Equipment operation and maintenance manuals.
 - c. HVAC control system maintenance and calibration information including wiring diagrams, schematics, and control sequence descriptions. Desired or field determined setpoints shall be permanently recorded on control drawings, at control devices, or for digital control systems, in programming comments.
 - d. A complete written narrative of how each system is intended to operate.
 - e. O&M Manuals shall include other information as listed elsewhere in the specifications.

1.05 QUALITY ASSURANCE – NOT USED

1.06 SYSTEM DESCRIPTION

A. EXTENT OF WORK – As identified in the drawings and schedules as it relates to this section.

B. DESIGN CRITERIA HVAC:

1. 75 degrees F / 50% RH

1.07 OWNER'S INSTRUCTIONS AND MAINTENANCE

- A. Refer to Section 01 77 00 for the General requirements for Contract Close-out. Furnish operating and maintenance data for all mechanical equipment.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. Refer to Division I for General Requirements.
- B. Before bidding, make complete investigation at Site in order to be informed as to location of utilities and as to conditions under which work is to be performed. Locations of existing above ground and underground utilities and structures shown were obtained from surveys and/or as built drawings and are not to be assumed as being accurate.
- C. Make determination of soil conditions before bidding. These specifications and accompanying drawings in no way imply as to condition of soil to be encountered.

3.02 DELIVERY, STORAGE, AND HANDLING - NOT USED

3.03 PREPARATION - NOT USED

3.04 CONSTRUCTION

A. CUTTING AND PATCHING

- 1. Provide all cutting and patching required to perform the Mechanical work.
- 2. All patching will be done by workmen skilled in the trade required.

B. EXCAVATION, TRENCHING, AND BACKFILLING

- 1. All excavation, trenching and backfilling in connection with the HVAC System is included as part of this Division unless otherwise coordinated by the Contractor.
- 2. All excavation required shall be done as part of the Bid Price regardless of any implied conditions on the Plans or in these Specifications.
- 3. Do not carry excavation below required level unless indicated otherwise on the Drawings. Excess excavation below required level shall be backfilled at no expense to Owner with earth, sand, gravel or concrete, as directed by Architect-Engineer and thoroughly compacted. Remove any unstable soil and replace with clean sand or soil and thoroughly compact. Architect-Engineer will determine the depth of removal of any unstable soil encountered. Grade ground adjacent to excavations to prevent water running in. Remove by pumping or other means any water accumulated in excavation.
- 4. Banks of trenches shall be vertical or as shown on the Drawings. Width of trench to be 5" minimum, 8" maximum on each side of pipe bell. Bottom of trench for sewers and culverts shall be rounded so that an arc of circumference equal to 0.6 of outside diameter or pipe rests on undisturbed soil wherever practicable. Excavate bell holes accurately to size by hand. In rock, excavations shall be carried 8" below bottom of pipe. Use loose earth or gravel for backfill and tamp thoroughly.
- 5. Bracing, sheathing and shoring shall be performed as necessary to complete and protect excavations indicated on the Drawings, as required for safety, as directed by Architect-Engineer, or to conform to governing laws.
- 6. After piping, conduit, ducts, etc. have been installed, inspected, tested and approved by governing agency, backfill trenches with clean, stable soil free from stones. Place backfill in 4" layers, tamped under and around pipe and conduit to height of at least 2'-0" above pipe. Tamping shall be done in such manner as not to disturb underlying work.

Remainder of trenches and excavations shall be backfilled with clean, stable earth, deposited in 8" layers and brought up to rough grade, with each layer compacted to density of surrounding soil. Remove sheathing and shoring as backfill is placed and fill space with dry sand.

7. Replace existing appurtenances removed or damaged in connection with work, and restore to original conditions, unless otherwise directed.

3.05 FIELD QUALITY CONTROL - NOT USED

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. Do not allow waste material or rubbish to accumulate in or about Job site.
- B. At completion of work, remove all rubbish, tools, scaffolding and surplus materials from and about building, leaving work clean and ready for use without further cleaning required. Clean all equipment, piping, valves, fixtures, and fittings of grease, metal cuttings, insulation cement, dust, dirt, paper labels, etc.
- C. Any discoloration or other damage to buildings, their finishes or furnishings due to failure to properly clean or keep clean HVAC systems shall be repaired without cost to Owner.

PART 4 SCHEDULES - NOT USED

END OF SECTION

HVAC FIRESTOP SYSTEMS 23 05 10

PART 1 GENERAL

1.01 SUMMARY

A. GENERAL DESCRIPTION

1. This section applies to HVAC. Specific requirements for fire-stopping indicated on drawings or in other sections of these specifications shall take precedence over items specified in this section.
2. This section includes:
 - a. Firestop systems for mechanical through-penetrations of the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:
 - i. Floors and ceilings
 - ii. Walls and partitions
 - iii. Smoke barriers
 - iv. Construction enclosed compartmentalized areas
 - b. Firestop systems for containment of fire, heat and smoke in grease/air ducts and pipes passing through the following fire-resistance-rated areas:
 - i. Occupied rooms and storage spaces
 - ii. Mechanical/electrical rooms, shafts, and closets
 - iii. Construction enclosed compartmentalized areas

- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

A. American Society for Testing and Materials Standards (ASTM):

1. ASTM E84: Standard Test Methods for Surface Burning Characteristics of Building Materials
2. ASTM E814: Standard Test Methods for Fire Tests of Through-Penetration Firestops
3. ASTM E119: Standard Test Methods for Fire Tests of Building Construction Materials
4. ASTM E1399: Standard Test Methods for Cyclic Movement and Measuring of Joint Systems
5. ASTM E1725: Standard Test Methods for Fire Tests of Fire-Resistive Barrier Systems of Electrical Systems Components
6. ASTM E1966: Standard Test Methods for Fire Tests of Joints

B. Underwriters Laboratories, Inc. (UL):

1. UL 723 Surface Burning Characteristics of Building Materials
2. UL 1479 Fire Tests of Through-Penetration Firestops, including optional air leak test
3. UL 2079 Fire Test of Building Joint Firestop Systems
4. UL Fire Resistance Directory (Component Listing Test Criteria)

- C. National Fire Protection Agency (NFPA)
 - 1. NFPA 80 Standard Fire Door Assembly Tolerances
 - 2. NFPA 252 Standard Fire Test for Fire Rated Doors (not specified for positive or negative furnace test pressure)
 - 3. NFPA 101 Life Safety Code
 - 4. NEC 70 National Electrical Code
- D. Definitions:
 - 1. Assembly: Particular arrangement of materials specific to a given type of construction described or defined in referenced documents.
 - 2. Barrier: Any bearing or non-bearing floor, wall, or ceiling assembly that has an hourly fire or smoke rating.
 - 3. Construction Gap: Any joint or opening, whether static or dynamic, within or between adjacent sections of interior or exterior walls, floors, ceilings, or roof decks.
 - 4. Engineering Judgment: Evaluations that are developed by a manufacturer for a new firestop system that complies with similar UL approved designs or tests that are acceptable to the code enforcing authorities.
 - 5. Firestopping: Methods and materials applied in penetrations and unprotected openings to limit the spread of heat, fire, gasses, and smoke.
 - 6. Firestop System: The use of a specific firestop material or combination of materials in conjunction with a specific wall, floor, or ceiling construction type and a specific penetrating material(s) to achieve a rated fire barrier.
 - 7. Intumescent: Materials that expand with heat to seal around objects threatened by fire.
 - 8. Penetration: Opening or foreign material passing through a floor, wall, ceiling barrier such that the full thickness of rated material(s) is breached either in total or in-part.
 - 9. Sleeve: Metal fabrication or pipe section that is a part of system that extends through a barrier.

1.03 SUBMITTALS

- A. PRODUCT DATA: Manufacturer's product literature for each type of firestop material as follows:
 - 1. Product characteristics, typical uses, installation procedures, performance and limitation criteria.
 - 2. Material Safety Data Sheets (MSDS)
- B. SHOP DRAWINGS: For each firestop system show construction conditions (including ratings of construction), relationships to adjoining construction, dimension, description of materials and finishes, component connections, anchorage methods, hardware and installation procedures, plus the following:
 - 1. Firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that confirms compliance with requirements for each condition indicated.

2. Documentation, including illustrations, from a qualified testing and inspection agency that is applicable to each firestop system configuration for construction and penetrating items. Manufacturer furnished installation details must comply with published documents by approved testing agencies (UL, OPL, Warnok Hersey, etc).
 3. Where Project conditions require modification of a qualified testing and inspecting agency's illustration to suit a particular firestop condition, submit illustration, with modifications marked, approved by firestop system manufacturer's fire-protection engineer.
- C. PRODUCT CERTIFICATES: Signed by manufacturers of firestop system products certifying that products furnished, comply with requirements.
- D. PRODUCT TEST REPORTS: From a qualified testing agency indicating that firestop system complies with requirements, based on comprehensive testing of current products.

1.04 QUALITY ASSURANCE

- A. GENERAL: Provide firestop systems that are produced and installed to resist the spread of fire according to requirements indicated, resist passage of smoke and other gasses, and maintain original fire-resistance rating of construction assembly.
- B. F-Rated Systems: Provide firestop systems with F-ratings, as determined per ASTM E814, but no less than that equaling or exceeding fire-resistance ratings of the construction assembly.
- C. T-Rated Systems: Provide firestop systems with T-ratings, as determined per ASTM E814 and ASTM E119, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas.
- D. L-Rated Systems: Provide firestop systems with L-ratings, as determined per ASTM E814, where systems maintain a barrier to cold smoke at all: penetrations, connections with other surfaces, separations required to permit building movement, sound or vibration absorption, and other construction gaps.
- E. For firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
- F. For firestop systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E84.
- G. Qualifications: Fire Protection Installer's Qualifications: Engage an experienced installer who is qualified by having the necessary experience, staff, and training to install manufacturer's products per specified requirements, plus the following:
1. Acceptable to or licensed by manufacturer, state or local authority.
 2. Established a record of successful in-service experience with firestop systems or completion of manufacturer's certified product installation training.
- H. Source Limitations: Obtain firestop systems for each kind of penetration and construction condition indicated, from a single manufacturer.
- I. Fire-Test-Response Characteristics: Provide firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article 1.04.
1. Firestopping tests and follow-up inspection services for firestop systems are performed by a qualified testing and inspection agency acceptable to authorities having jurisdiction.

2. Firestop systems are identical to those tested per ASTM E814 or UL 1479 and comply with the following requirements:
 - a. Firestop system products bear classification marking of qualified testing and inspecting agency.
 - b. Firestop systems correspond to those indicated by reference to firestop system designations listed by the following:
 - i. UL in "Fire Resistance Directory"
 - ii. ITS (Warnock Hersey) in "Directory of Listed Products"
 - iii. Omega Point Laboratories
 - iv. Factory Manual
 - c. Local and State regulatory requirements: Submit forms of acceptance for proposed assemblies not conforming to specific UL Firestop System numbers or UL classified devices.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK – As identified in the drawings and schedules as it relates to this section.
- B. Coordinate construction and sizing of sleeves, openings, core-drilled holes, cut openings and penetrating items to ensure that firestop systems are installed according to specified requirements.
- C. Notify owner's inspecting agency at least seven (7) days in advance of firestop system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover-up or conceal firestop system installations behind other construction until owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.
- E. Copy Architect/Engineer with written record of all inspections of firestop installations. Record should include the date, a list of installations inspected, the name of inspecting agency, and the name of inspecting agency's representative performing the inspection.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE

- A. - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS/EQUIPMENT

A. GENERAL

1. Firestop systems and materials shall meet the requirements specified herein.
2. Architect/Engineer must review and accept in writing any alternates to the firestop system and materials specified herein.
3. Compatibility: Provide firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through the firestop system, under conditions of service and application, as demonstrated by the firestop system manufacturer based on testing and field experience.

B. THROUGH-PENETRATION FIRESTOP SYSTEMS FOR FIRE-RATED ASSEMBLIES:

1. Systems or devices listed in the UL Fire Resistance Directory under categories XHCR (firestop devices) and XHEZ (firestop systems) may be used, providing that they conform to the construction type, penetrant type, annular space requirements and fire rating

involved in each separate instance, and that the system is symmetrical for wall applications. Systems or devices must be asbestos-free.

2. Additional Requirements: Withstand the passage of cold smoke either as an inherent property of the system, or by the use of a separate product included as a part of the UL system or device and designed to perform this function.
 3. All through-penetration Firestop system products must be from a single manufacturer.
 4. Acceptable Products: Those listed in the UL Fire Resistance Directory for the UL System involved and defined in the attached Systems and Applications Schedule.
- C. FIRESTOP SYSTEMS FOR CONDUITS INSTALLED BY THE HVAC DIVISION PASSING THROUGH FIRE-RESISTANCE RATED AREAS:
1. Electrical System protection material listed in UL-classified UL 1709, ASTM E119, ASTM E1529, and ASTM E1725.
 2. All firestop system products provided by the mechanical division must be from a single manufacturer.
 3. Acceptable products: Those listed in the UL Fire Resistance Directory for the UL System involved and defined in the material schedule below:
 - a. Fire resistive mats: 3M™ Interam™ Endothermic Mats, 0.3" or 0.4" thick, 24.5" or 49" wide x 16', 20', or 25' long rolls, foil encapsulated with 3M™ logo.
 - b. Smoke and Flame Sealant: 3M™ FireDam™ 150 Caulk
 - c. Foil Tape: 3M™ Interam™ T-49 Aluminum Foil Tape – used as a vapor barrier, radiant heat reflector, and installation aid.
 - d. General Purpose Tape: Scotch® 898 Filament Tape – used as installation aid.
 - e. Composite Sheet: 3M™ Fire Barrier CS-195+ Composite Sheet – used to cover openings and as a collar at the termination of the fire protection envelopes.
 - f. Firestopping Caulk: 3M™ Fire Barrier CP 25WB+ Caulk – used as a smoke and flame sealant.

2.02 FINISHES - NOT USED

2.03 ACCESSORIES

- A. Accessories: Provide components for each firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article 1.04. Use only components specified by firestop systems manufacturer and approved by the qualified testing and inspecting agency for the firestop systems indicated. Accessories include, but are not limited to, the following items:
1. Permanent forming/damming/backing materials, including the following:
 - a. Slag/rock-wool-fiber insulation
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state
 - c. Fire-rated form board
 - d. Fillers for sealants
 2. Temporary forming materials
 3. Substrate primers
 4. Collars and steel sleeves

2.04 FABRICATION - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements.
- B. Examine areas and conditions under which firestop system is to be installed and notify the architect/engineer of conditions detrimental to proper or timely completion of the work.
- C. Examine substrates to determine they are satisfactory to receive firestop system materials.
 - 1. Conduct tests according to firestop systems manufacturer's written recommendations to verify that substrates are free of oil, grease, rolling compounds, incompatible primers, loose mill scale, dirt or other foreign substances capable of impairing bond of fire-resistive materials.
 - 2. Verify objects penetrating firestop materials, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
 - 3. Verify substrates are not obstructed by ducts, piping, equipment, and other suspended construction that will interfere with applying fire-resistive materials.
- D. Verify that environmental conditions are safe and suitable for installation of firestop materials.
- E. Do not proceed with installation of firestop system until unsatisfactory conditions have been corrected by the contractor in a manner acceptable to the architect/engineer.

3.02 DELIVERY, STORAGE, AND HANDLING

- A. Deliver firestop systems products to project site in original, unopened containers or packages with intact and legible manufacturer's labels identifying product and manufacturer, date of manufacture, lot number, shelf life, qualified testing and inspection agency's classification marking, curing time, and mixing instructions.
- B. Store and handle materials for firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes. Follow manufacturer's instructions.

3.03 PREPARATION

- A. JOB CONDITIONS
 - 1. Clean and repair substrates that could impair the adhesion or proper fitting of firestop materials, including oil, grease, rolling compounds, incompatible primers, and loose mill scale.
 - 2. Secure all pipe, conduit, cable and other items which penetrate firestop materials.
 - 3. Provide masking and temporary covering, as required, to prevent contamination of adjacent surfaces by firestop materials.
- B. SURFACE PREPARATIONS
 - 1. Existing Conditions: Verify the condition of the substrates and correct unsatisfactory conditions before installing firestop system products; follow manufacturer's instructions.

2. Environmental Limitations: Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestop systems.
3. Ventilation: Ventilate firestop systems during installation per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.
4. Protection: Provide masking and drop cloths to prevent contamination of surfaces by firestop system materials.

3.04 INSTALLATION

A. CONSTRUCTION/INSTALLATION

1. Installation of firestop systems shall be performed in strict accordance with manufacturer's detailed installation instructions and procedures.
2. Extend firestop material in full thickness over entire area of each substrate or opening to be protected.
3. Protect firestop material from damage on surfaces subject to traffic.

B. COORDINATION WITH OTHER WORK - NOT USED

C. INSTALLATION OF THROUGH-PENETRATION FIRESTOP SYSTEMS

1. Install through-penetration firestop systems to comply with Article 1.04 and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated. (See Article 4.01 "Through-Penetration Firestop Systems Schedule")
2. Install forming/damming/backing materials and other accessories of types required to support fill material during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - a. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop system.
3. Install fill materials for firestop systems by proven techniques to produce the following results:
 - a. Fill voids and activities formed by openings, forming materials, accessories and penetrating items as required to achieve fire-resistance ratings indicated.
 - b. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - c. For fill materials that will remain exposed after completing work, finish to produce smooth, uniform surfaces that are flush with adjoining surfaces.

3.05 FIELD QUALITY CONTROL

A. FIELD QUALITY CONTROL - GENERAL

1. Proceed with enclosing through-penetration firestop systems with other construction only after inspection and approval by code authorities.
2. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.
3. Inspection Agency: If required, owner will engage a qualified independent inspecting agency to inspect through-penetration firestop systems and to prepare test reports

indicating whether through-penetration firestop systems comply with or deviate from requirements.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

A. CLEANING AND PROTECTION

1. Clean off excess fill materials adjacent to openings as work progresses using methods and cleaning materials that are approved in writing by through-penetration firestop systems manufacturer and that do not damage materials in which openings occur.
2. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop system complying with specified requirements.

PART 4 SCHEDULES

4.01 THROUGH PENETRATION FIRESTOP SYSTEMS SCHEDULE

Penetrating Item	Concrete	Gypsum	Wood Floor/Ceiling
Blanks 0000 Series	CAJ0004 CS-195+, GIS CAJ0007 MPS-2+ CAJ0008 2000, 2000+ CAJ0009 CP 25WB+ CAJ0060 1000, 1003 FA0004 CS-195+ WJ0003 2001		
Metallic Pipes 1000 Series	CAJ1001 CP 25WB+ CAJ1006 CS-195+, FS-195+ CAJ1009 2000, 2000+ CAJ1013 2000, 2000+ CAJ1014 2000, 2000+ CAJ1017 FD-150 CAJ1027 MPS-2+ CAJ1044 CP 25WB+ CAJ1052 CP 25WB+ CAJ1058 2000, 2000+, 2003 CAJ1060 2000, 2000+ CAJ1066 CP 25WB+ CAJ1091 CP 25WB+ CAJ1092 CP 25WB+ CAJ1112 FS-195+, CP 25WB+ CAJ1160 CP 25WB+ CAJ1175 CP 25WB+ CAJ1176 CP 25WB+ CAJ1188 2000+ CAJ1216 CP 25WB+ CAJ1225 CP 25WB+	WL1001 CP 25WB+ WL1003 CP 25WB+ WL1009 2000, 2000+ WL1010 2000, 2000+ WL1016 CP 25WB+ WL1017 CP 25WB+ WL1032 CP 25WB+ WL1036 FD-150 WL1037 CS-195+, FS- 195+, GIS WL1067 CP 25WB+ WL1073 CP 25WB+ WL1077 CP 25WB+ WL1080 MPS-2+ WL1082 2000+ WL1084 2000+ WL1096 CP 25WB+ WL1133 CP 25WB+ WL1146 CP 25WB+ WL1157 1000 WL1166 CP 25WB+, MPS-2+	FC1002 CP 25WB+ FC1003 2000, 2000+ FC1006 CP 25WB+ FC1015 CP 25WB+ FC1029 CP 25WB+ FC1036 CP 25WB+ FC1060 FD-150+

	CAJ1241 CP 25WB+ CAJ1274 CP 25WB+ CAJ1275 FireDam™ Spray CAJ1292 1000, 1003 CAJ1306 CP 25WB+ CAJ1317 FD-150+ CBJ1020 CS-195+, FS- 195+, GIS FA1002 CP 25WB+ FA1011 CP 25WB+ FB1006 CP 25WB+ WJ1010 CP 25WB+ WJ1023 2001	WL1167 FD-150+	
Non-Metallic Pipes 2000 Series	CAJ2001 FS-195+, 1" & 2" wide, PPDs CAJ2002 FS-195+ CAJ2003 CS-195+, FS- 195+, GIS CAJ2005 FS-195+ CAJ2006 FS-195+ CAJ2019 2000, 2000+ CAJ2027 FS-195+, CP 25WB+ CAJ2028 FS-195, MPS- 2+ CAJ2029 FS-195+, PPDs CAJ2030 CS-195+, FS- 195+, GIS CAJ2044 FS-195+, CP 25WB+ CAJ2117 FS-195+ CAJ2133 FS-195+ CAJ2143 FS-195+ CAJ2144 CP 25WB+ CAJ2161 CP 25WB+ CAJ2189 FS-195+ CAJ2213 CP 25WB+ CAJ2214 Ultra GS CAJ2216 Ultra GS CAJ2226 Ultra PPD CAJ2227 Ultra PPD CAJ2228 Ultra GS CAJ2241 Ultra GS CAJ2242 Ultra GS CBJ2007 CP 25WB+ FA2002 CS-195+, FS- 195+, MPS-2+, PPDs FA2021 CS-195+, FS- 195+, MPS	WL2002 FS-195+, PPDs WL2003 FS-195+ WL2004 FS-195+ WL2005 FS-195+, 4" wide WL2006 FS-195+ WL2031 CS-195+, FS-195+, GIS WL2032 CS-195+, FS-195+, GIS WL2033 FS-195+ WL2073 FS-195+ 1" wide, PPDs WL2087 FS-195+ WL2088 CP 25WB+, MPS-2+ WL2090 FS-195+ WL2091 MPS-2+ WL2092 FS-195+ WL2097 CP 25WB+, MPS-2+ WL2099 FS-195+ WL2112 CP 25WB+ WL2146 CP 25WB+, Caulk WL2147 Ultra GS, CP 25WB+, MPS2+ +WL2148 Ultra GS WL2149 Ultra GS WL2150 Ultra GS WL2154 Ultra GS, CP 25WB+WL2162 Ultra PPD	FC2002 FS-195+, PPDs FC2007 FS-195+, PPDs FC2008 FS-195+ FC2024 FS-195+, 1" & 2" wide, PPDs FC2026 FS-195+ FC2028 FS-195+, 1" & 2" wide, PPDs FC2039 CP 25WB+, MPS-2+ FC2064 FS-195+ FC2073 CP 25WB+ FC2092 FS-195+, CP 25WB+ MPS-2+ FC2115 FS-195+, Ultra GS FC2116 FS-195+, CP 25WB+ FC2129 Ultra PPD FC2134 CP 25WB+ FC2141 CP 25WB+, Ultra GS
Penetrating Item	Concrete	Gypsum	Wood Floor/Ceiling
Non-Metallic Pipes	FA2027 FS-195+ FA2033 Ultra GS, Ultra	WL2172 1000 WL2173 1000	

<p>2000 Series (CONT'D)</p>	<p>PPD, CP 25WB+ caulk, GIS FA2041 Ultra GS FA2045 Ultra GS FB2005 Ultra GS, 1000 FB2006 Ultra GS, MPS- 2+, 1000 WJ2012 FS-195+, 1" wide, PPDs WJ2029 CP 25WB+, MPS-2+</p>	<p>WL2174 1000 WL2180 Ultra GS, CP 25WB+, MPS-2+</p>	
<p>Insulated Pipes 5000 Series</p>	<p>CAJ5001 CP 25WB+ CAJ5002 FS-195+ CAJ5003 FS-195+ CAJ5005 MPS-2+ CAJ5009 2000, 2000+ CAJ5017 FS-195+, CP 25WB+ CAJ5022 FS-195+ CAJ5024 FS-195+ CAJ5030 CS-195+, FS- 195+, GIS CAJ5041 2000, 2000+ CAJ5060 CP 25WB+ CAJ5074 2000+ CAJ5080 FS-195+ CAJ5119 CP 25WB+ CAJ5125 1000, 1003 CBJ5002 CP 25WB+ CBJ5003 FS-195+ FA5001 FS-195+, CP 25WB+ WJ5013 CP 25WB+ WJ5014 CP 25WB+ WJ5015 CP 25WB+</p>	<p>WL5001 FS-195+ WL5002 FS-195+ WL5009 FS-195+ WL5010 FS-195+ WL5011 CP 25WB+ WL5032 2000, 2000+ WL5038 CP 25WB+ WL5039 CP 25WB+ WL5040 CP 25WB+ WL5045 CP 25WB+ WL5053 2000+ WL5089 1000</p>	<p>FC5002 FS-195+ FC5008 FS-195+ FC5009 CP 25WB+</p>
<p>HVAC Ducts 7000 Series</p>	<p>CAJ7003 CP 25WB+ CAJ7013 2000+ CAJ7015 2000+ CAJ7016 CP 25WB+ CAJ7017 CP 25WB+, GIS CAJ7020 2000+ CAJ7022 2000+ CAJ7050 2000+ CAJ7053 2000+</p>	<p>WL7008 CP 25WB+ WL7013 CP 25WB+ WL7016 CP 25WB+ WL7032 CP 25WB+ WL7041 FireMaster® Duct Wrap, 2000+</p>	<p>FC7001 CP 25WB+</p>
<p>Combos 8000 Series</p>	<p>CAJ8001 CS-195+, FS- 195+, GIS CAJ8003 2000, 2000+ CAJ8013 FS-195+, CP 25WB+ CAJ8060 PPD, CP 25WB+, MPS-2+ CAJ8069 CS-195+, FS-</p>	<p>WL8002 CS-195+, FS-195+ WL8010 FS-195+, CP 25WB+ WL8021 FS-195+, CP 25WB+ WL8022 1000</p>	<p>FC8012 FS-195+ FC8013 PPDs</p>

	195+, GIS, CP 25WB+ CAJ8072 CP 25WB+ CAJ8073 3M Mortar, FS- 195+, CP 25WB+, MPS- 2+ CAJ8075 1000, 1003 CBJ8004 CS-195+, FS- 195+, GIS CBJ8005 CS-195+, MPS- 2+ CBJ8008 2001 FA8001 FS-195+, CP 25WB+ FB8001 PPD, CP 25WB+, MPS-2+		
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END OF SECTION

HVAC SUPPORTING SYSTEMS 23 05 29

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION - Provide adequate pipe, equipment foundation and suspension systems in accordance with recognized engineering practices, using, where possible, standard, commercially accepted hangers and accessories.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. All pipe hangers and supports shall conform to the latest requirements of the Code for Pressure Piping, Refrigeration Piping ANSI/ASME B31.5-74 and Manufacturers' Standardization Society of Valve & Fittings Industry Documents MSS-SP-58-75 and MSS-SP-69-76.
- B. All auxiliary steel necessary for the installation of the pipe hangers and supports shall be designed in accordance with the AISC 1978 Specification and Requirements of Section 05 50 00 MISCELLANEOUS METALS, and as indicated on the Drawings.
- C. Supporting systems shall comply with local mechanical and plumbing codes.
- D. AWS D1.1
- E. ASTM A780
- F. SSPC – PA 1

1.03 SUBMITTALS - NOT USED

1.04 QUALITY ASSURANCE

- A. Engineering Responsibility: Where standard pre-engineered commercially accepted hangers and accessories with documented application criteria are not available, engage a professional engineer to design and prepare Shop Drawings and calculations for each supporting system.
 - 1. Professional Engineer Qualifications: Professional engineer legally qualified to practice in the project state and experienced in providing engineering services kind indicated. Engineering services are defined as those performed for installations of hangers and supports that are similar to those indicated for this Project in material, design, and extent.

1.05 SYSTEM DESCRIPTION

- A. Supporting Steel not shown for the equipment will be designed, supplied and erected by the Contractor. (The supporting steel is that steel which is connected to the structure shown on the Drawings and carries the weight of the mechanical items.) This supporting steel design must carry the dead weight and dynamic load imposed by the equipment.
- B. The supporting steel shall be connected to the structure in such a manner as not to overload the structure. It is the responsibility of the mechanical contractor and the steel fabricator to verify that this purpose is accomplished. It is the responsibility of the mechanical contractor to call to the attention of the Architect-Engineer any deficiency prior to bidding.

- C. Where thermal movement in the pipeline will occur, the pipe hanger assembly must be capable of supporting the line in all operating conditions. Accurate weight balance, calculations shall be made to determine the supporting force at each hanger in order to prevent excessive stress in either pipe or connected equipment.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE

- A. Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS/EQUIPMENT

NOTE: Numbers refer to ANVIL; equal devices by B-Line will be acceptable.

A. CONCRETE INSERTS

- 1. Inserts shall be Figures 281, 282 or Powerstrut 359 stanchion where a continuous insert is required.

B. BEAM & STEEL JOIST CLAMPS

- 1. Clamps shall be Figures 133, 134, 218, 225, 226, 228, or 292.

C. RISER CLAMPS

- 1. Riser clamps shall be Figure 261, for steel pipe or Figure CT121 for copper tubing.

D. HANGER RODS

- 1. Hanger rods shall be Figures 140 and 146. Eye rods shall be Figures 248 and 248L.

E. PIPE HANGERS

- 1. All hangers for piping 2" or larger shall be provided with means of vertical adjustment.
- 2. On uninsulated steel pipe, hangers shall be Figures 104, 108, 212, or 260. On piping 2" and smaller, Figures 70, 97, or 138R will be permitted.
- 3. On uninsulated copper tubing, hangers shall be Figures CT-65, CT-69, CT-99, CT-109, OR CT-122R.
- 4. On insulated copper tubing, hangers shall be Figures 70, 97, 104, or 108 and shall be placed on the outside of the insulation with a Figure 167 Shield. The Figure 167 Shield shall be applied to distribute the hanger load over the insulation and to eliminate damage to the vapor barrier on the covering.
- 5. Base supports shall be Figures 259 or 264.

F. BRACKETS AND RACKS

- 1. Welded steel brackets shall be Figures 194, 195 and 199. Multiple pipe racks or trapeze hangers shall be fabricated from Powerstrut channel, clamps, and accessories.

G. GUIDES AND SLIDING SUPPORTS

- 1. Guides shall be Figures 171, 175, 177, or 256. Sliding supports shall be Figures 280, 432, 435, 436, 437, or 438.

H. ROOF PENETRATIONS

1. Duct and pipe roof penetrations shall be made with PATE or ROOF PRODUCTS AND SYSTEMS CORP. devices, installed as recommended by the manufacturer.

I. AUXILIARY STEEL

1. Furnish all miscellaneous structural members necessary to hang or support pipe or mechanical equipment. Material of members shall be consistent with that of the main structural system.
2. All auxiliary steel shall receive one shop coat of primer paint prior to installation.
3. Notify Architect-Engineer of any adjustment necessary in main structural system for proper support of major equipment.

J. CONCRETE PADS

1. Provide four inch thick concrete pads under all floor-mounted equipment and apparatus. Dowel into structural floor slab.

2.02 FINISHES - NOT USED

2.03 ACCESSORIES - NOT USED

2.04 FABRICATION - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements.

3.02 DELIVERY, STORAGE, AND HANDLING - NOT USED

3.03 PREPARATION - NOT USED

3.04 CONSTRUCTION/INSTALLATION

A. ATTACHING TO STRUCTURE

1. Where equipment or piping is supported off a concrete structure, inserts shall be used. Where support rod sizes exceed 7/8" diameter or where the pipe load exceeds the recommended load for the insert, use 2 inserts with a trapeze type connecting member below the concrete. In cases where pipes are supported from existing slab, use Phillips; "RED HEAD" or equal, sized for Safety Factor 4.
2. Where equipment or piping is supported from building steel beam, clamps or welded beam attachments shall be used. Holes drilled in building steel for hanger support rods will not be permitted.
3. All vertical runs of piping shall be supported at each floor.

B. HANGER RODS AND SPACING

1. Where hanger rod sizes are catalog-listed for a specified hanger, this size shall govern. Where hanger rod sizes are not catalog-listed, the load on the hanger shall be the determining factor and the maximum recommended hanger rod load as catalog-listed, shall govern.
2. Pipe hangers shall be at each change in direction, not more than 2'-0" from end of run and on straight runs at each joint or the spacing shall not exceed which ever is closer:

<u>PIPE SIZE</u>	<u>STEEL PIPE</u>	<u>COPPER</u>
To 3/4"	7'-0"	5'-0"
1" To 2"	10'-0"	8'-0"
2-1/2" To 4"	12'-0"	10'-0"
5" To 8"	16'-0"	10'-0"
10" and Larger	20'-0"	10'-0"

3. Provide supports at concentrated loads such as equipment, in-line pumps, valves and other piping specialties, to prevent line sag and/or excess stress in the piping systems.
 4. For cast iron pipe provide hanger at each joint or fitting with a maximum spacing of 5'-0" on center.
 5. Where distance between riser clamp and hanger exceed 10'-0" in height, intermediate clamps shall be installed to provide support or alignment at a maximum of every 10'-0".
 6. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.
 7. Provide pipe hanger clamp within 18 inches of all elbows and tees.
- C. Insulated Piping: Comply with the following:
1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits according to ASME B31.1 for power piping and ASME B31.9 for building services piping.
 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
 5. Insert Material: Length at least as long as protective shield.
 6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.
- D. EQUIPMENT SUPPORTS
1. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
 2. Grouting: Place grout under supports for equipment and make smooth bearing surface.
 3. Provide lateral bracing, to prevent swaying, for equipment supports.
- E. METAL FABRICATIONS

1. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
2. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
3. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.05 FIELD QUALITY CONTROL - NOT USED

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

A. ADJUSTING

1. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. PAINTING

1. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - a. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
2. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

PART 4 SCHEDULES - NOT USED

END OF SECTION

HVAC WIND RESTRAINTS 23 05 48

PART 1 GENERAL

1.01 SUMMARY

- A. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.
- B. Definitions:
 - 1. Vult Ultimate design wind speed (3-second gust).
 - 2. Vasd Nominal design wind speed.

1.02 SUBMITTALS

- A. The manufacturer of wind restraints shall provide submittals for products as follows:
 - 1. Descriptive Data:
 - a. Catalog cuts or data sheets on vibration isolators and specific restraints detailing compliance with the specification.
 - 2. Shop Drawings:
 - a. Submit fabrication details for equipment bases including dimensions, structural member sizes and support point locations.
 - b. Provide details of ground-mounted rooftop units and their attachments to their curb and the curb's attachment to structure. Provide details of air-cooled condensing units and their attachments to their associated concrete pads. Provide details of outdoor ductwork and their attachment to duct support stands, and the stand attachment to the concrete.
 - c. Provide specific details for use of wind clips where required.
 - d. Where walls, floors, slabs or supplementary steel work are used for wind restraint locations, details of acceptable attachment methods for ducts and pipe must be included and approved before the condition is accepted for installation. Restraint manufacturers' submittals must include spacing, static loads, and wind loads at all attachment and support points.
 - e. Provide specific details of wind restraints and anchors; include number, size and locations for each piece of equipment.
 - f. Scaled drawings of ductwork, piping and equipment shall be provided showing the location and details of attachment of all wind restraints.
 - g. Approved scaled shop drawings shall be submitted to Office of Code Enforcement prior to the beginning of installation by this contractor. Copy of transmittal shall be sent to the Designer.
 - h. A copy of the approved shop drawings shall be on site prior to the first mechanical Code Enforcement inspection.
 - 3. Wind Load Certification and Analysis:
 - a. Wind restraint calculations shall be provided for all connections of equipment to the structure. Calculations shall be stamped by a registered professional engineer with at least five years of seismic & wind load design experience, licensed in the State of Arkansas.
 - b. All restraining devices shall have a preapproval number from California OSHPD or some other recognized government agency showing maximum restraint ratings. Preapprovals based on independent testing are preferred to preapprovals based on calculations.

Where preapproved devices are not available, submittals based on independent testing are preferred. Calculations (including the combining of tensile and shear loadings) to support seismic restraint designs must be stamped by a registered professional engineer with at least five years of seismic and wind load design experience and licensed in the State of Arkansas. Testing and calculations must include both shear and tensile loads as well as one test or analysis at 45E to the weakest mode.

- c. Analysis must indicate calculated dead loads, wind loads, and capacity of materials utilized for connections to equipment and structure. Analysis must detail anchoring methods, bolt diameter, embedment and/or welded length. All wind restraint devices shall be designed to accept, without failure, the forces acting through the equipment center of gravity. Overturning moments may exceed forces at ground level.

1.03 PERFORMANCE REQUIREMENTS

- A. Wind design criteria shall meet the requirements of the 2021 International Building Code and ASCE7-16. If the values below differ from those shown on the structural plans, use values shown on structural plans.
- B. Wind Design Criteria: 2021 International Building Code (IBC).
 1. Vult = 106
 2. Vasd = 83
 3. Wind Exposure = C
- C. Seismic Design Criteria: 2021 International Building Code (IBC) and ASCE7-16.
 1. Sds = 0.197.
 2. Sd1 = 0.11.
 3. Site Class = C
 4. Risk Category = II
 5. Seismic Design Category = B
 6. According to ASCE7-16, mechanical and electrical components in Seismic Design Category B buildings are exempt from the requirements of ASCE7-16 Chapter 13 Seismic Design Requirements for Nonstructural Components.

1.04 QUALITY ASSURANCE

- A. Calculations (including combining shear and tensile loads) to support wind-restraint designs must be signed and sealed by a registered professional engineer. Testing and calculations must include both shear and tensile loads and 1 test or analysis at 45 degrees to the weakest mode.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of Arkansas and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of wind restraints that are similar to those indicated for this Project in material, design, and extent.
- C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

PART 2 PRODUCTS

2.01 MATERIALS

A. WIND-RESTRAINT DEVICES

1. Anchor Bolts: Seismic-rated, drill-in, and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488/E 488M.
2. Manufacturers:
 - a. Amber/Booth Company, Inc.
 - b. B-Line Systems, Inc.
 - c. Kinetics Noise Control, Inc.
 - d. Mason Industries, Inc.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING – NOT USED

3.03 PREPARATION – NOT USED

3.04 INSTALLATION

- A. Install wind control devices according to shop drawings.
- B. Install curbs and equipment supports
- C. Install steel angles or channel, sized to prevent buckling.
- D. Install resilient bolt isolation washers on equipment anchor bolts.

3.05 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. Adjust wind restraints to permit free movement of equipment within normal mode of operation.
- B. Torque anchor bolts according to equipment manufacturer's written recommendations to resist wind forces.

PART 4 SCHEDULES – NOT USED

END OF SECTION

HVAC IDENTIFICATION 23 05 53

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: This Section includes the mechanical identification materials and their installation on the required HVAC equipment. Included identification materials are Equipment nameplates, markers, and signage, and markers for access panels, and, ducts.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. ASTM D709

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Not Used

1.04 QUALITY ASSURANCE

- A. EQUIPMENT IDENTIFICATION
 - 1. Provide nameplates for all HVAC equipment

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK – As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE

- A. Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS/EQUIPMENT

- A. EQUIPMENT IDENTIFICATION DEVICES
 - 1. Equipment Nameplates: Metal, with data engraved or stamped, for permanent attachment on equipment.
 - a. Data:
 - i. Manufacturer, product name, model number, and serial number.
 - ii. Capacity, operating and power characteristics, and essential data.
 - iii. Labels of tested compliances.
 - b. Location: Accessible and visible.
 - c. Fasteners: As required to mount on equipment.
 - 2. Equipment Markers: Engraved, color-coded laminated plastic. Include contact-type, permanent adhesive.
 - a. Terminology: Match schedules as closely as possible.
 - b. Data:
 - i. Name and plan number.

- ii. Equipment service.
 - iii. Design capacity.
 - iv. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
 - c. Size: Minimum 2-1/2 by 4 inches for control devices, dampers, and valves; minimum 4-1/2 by 6 inches for equipment.
- 3. Equipment Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine sub-core, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.
 - a. Data: Instructions for operation of equipment and for safety procedures.
 - b. Engraving: Manufacturer's standard letter style, of sizes and with terms to match equipment identification.
 - c. Thickness: Minimum 1/16 inch, unless otherwise indicated.
 - d. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.
- 4. Access Panel and Door Markers: Minimum 1/16-inch thick, engraved laminated plastic, with abbreviated terms and numbers corresponding to identification. Provide 1/8-inch center hole for attachment.
 - a. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.
- 5. Arrows shall be of same color as bands and shall be point in direction of flow and indicate normal working pressure.
- 6. Damper tags and equipment nameplates shall be white on black laminated plastic.

2.02 FINISHES - NOT USED

2.03 ACCESSORIES - NOT USED

2.04 FABRICATION - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

A. REFER TO DIVISION 1 for General Requirements.

3.02 DELIVERY, STORAGE, AND HANDLING - NOT USED

3.03 PREPARATION - NOT USED

3.04 CONSTRUCTION

A. INSTALLATION

- 1. Legends shall be securely fixed to the pipes with full circumference bands on each side of legend. Arrow downstream of legend shall have a full circumference band at the arrow end.
- 2. Equipment nameplates shall be labeled the same as shown on the contract documents and shall be securely attached to the equipment.

3. Damper tags shall be lettered to say: "THIS DAMPER HAS BEEN ADJUSTED TO MEET INDOOR AIR QUALITY STANDARDS. DO NOT TAMPER."
 - B. COORDINATION WITH OTHER WORK - NOT USED
- 3.05 FIELD QUALITY CONTROL - NOT USED
- 3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK
 - A. Relocate HVAC identification materials and devices that have become visually blocked by other work.
 - B. Clean faces of HVAC identification devices.

PART 4 SCHEDULES - NOT USED

END OF SECTION

HVAC START-UP, TESTING, BALANCING AND ADJUSTING 23 05 94

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: HVAC equipment testing, adjusting and balancing as specified herein shall be provided by the Testing & Balancing Agency (TBA).
- B. Contractor shall include scheduling & coordination of work with TBA including access to the construction site.
- C. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. Test and balance procedures shall be conducted by a National Environmental Balancing Bureau (NEBB) or Associated Air Balance Council (AABC) certified TBA.

1.03 OMISSIONS OF MATERIALS AND EQUIPMENT

- A. All abnormal conditions shall be identified in the report. The TBA shall not be required to correct Contractor errors and/or omissions. It shall be the responsibility of the TBA to notify the Architect-Engineer and Contractor of problems found and work with the Contractor toward finding a satisfactory solution.

1.04 SUBMITTALS

A. PRODUCT DATA

- 1. Strategies and Procedures Plan: Submit TBA strategies and step-by-step procedures as specified in Part 3 "Preparation" Article. Include a complete set of report forms intended for use on this Project.
- 2. Certified TBA Reports: Submit two copies of reports prepared, as specified in this Section, on approved forms certified by the TBA.
- 3. Submittal shall include Contracting License Number, and name of the proposed resident engineer for the project.
- 4. Contractor shall submit, within 45 days after Notice to Proceed, six (6) copies of submittal data on the qualification of the TBA awarded subcontract. Submittal shall include TBA's active AABC or NEBB certification.
- 5. Mechanical Contractor shall furnish to the TBA one copy of approved submittal on all HVAC equipment and one set of HVAC plans and specifications immediately upon the Mechanical Contractor's receipt of notice to proceed with the Mechanical work.

B. REPORT

- 1. The certified report shall include the following information:
 - a. Complete testing and balancing data.
 - b. All equipment manufacturer's start-up logs, check-lists, and start-up forms.

1.05 QUALITY ASSURANCE

A. QUALIFICATIONS

- 1. The TBA subcontractor shall be independent entity from the Contractor performing the HVAC work since one of his primary functions as a third party professional representative will be to verify the system's proper performance.

2. The TBA shall be active in the field of Testing and Balancing of Heating, Ventilating, and Air Conditioning Systems and shall have successfully completed at least five projects of similar size and scope in which they have performed both a Temperature and an Energy Balance.
3. All work shall be done under the supervision of a full-time employee of the agency with at least five years' experience in HVAC "System Testing and Balancing ". All reports shall bear this individual's signature certifying accuracy and corrections.

B. START-UP

1. All major equipment shall be started by a factory trained service mechanic, or a UA-MCA Certified Technician that is experienced in the service and operation of that piece of equipment. The Mechanical Contractor shall start-up and place into operation all auxiliary equipment such as fans, pumps, etc.
2. The Mechanical Contractor is to provide the Architect-Engineer with the equipment manufacturers' executed pre-start checklist and start-up forms. The completed documents shall be signed and dated by the contractor.

C. ACCEPTANCE

1. The Owner and Architect-Engineer will not accept the building until the system has gone through properly start-up, balancing, and appears to be operating per the design; and contractor has submitted properly executed required documentation.

1.06 SYSTEM DESCRIPTION

- A. **AIR BALANCE:** A complete air balance of this project will be required as specified in sections herein.
- B. **TEST ALL EQUIPMENT:** Verify that the equipment is performing basically as specified.
- C. **VERIFY FUNCTIONING OF CONTROLS:** Check controls and verify that the controls and sequences are performing as specified.
- D. **Prepare a TEST REPORT:** Submit test results, deficiency report, and recommendations.
- E. **RETEST** (in the presence of the Engineer/Architect's representative) selected items as required to verify the test report accuracy.
- F. Check alignment of all fans on RTU's, exhaust fans, supply fans, and report all units that are not aligned properly.

1.07 OWNER'S INSTRUCTIONS AND MAINTENANCE

- A. Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS/EQUIPMENT

A. GENERAL

1. The Testing Agent shall own all the instruments, gages, thermometers, etc. necessary to properly do the work.

B. CALIBRATION

1. All instruments shall have been recalibrated within 180 days of use. Submit Certificates with final report verifying proper recalibration.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. The TBA shall ensure that all required test points, balancing dampers, flow measuring devices, etc., are being properly installed. The TBA shall report to the Architect-Engineer and Contractor any and all discrepancies he may find during each visit. The TBA shall be given access to the project site at all times.

3.02 DELIVERY, STORAGE, AND HANDLING - NOT USED

3.03 PREPARATION

A. GENERAL

1. The Contractor shall review the plans with the TBA prior to installing the piping and ductwork systems to ensure the proper placement of all balancing devices. The Contractor shall have completed all duct work and installed all grilles, registers, diffusers, dampers, access doors, turning vanes, air monitors, balancing devices, etc., before the TBA begins work.
2. The Contractor shall complete the installation of all piping, insulation, controls and devices and place the entire system into operation before the TBA begins balancing work.

B. PREPARATION PHASE I - JOB VISITS

1. The Mechanical Contractor shall coordinate with the TBA giving advance notice before testing and balancing is required. TBA shall provide the Mechanical Contractor with a pre-balancing checklist, which shall be reviewed by the Contractor.

C. PROCEDURE PHASE II - TEST AND BALANCE SYSTEM

1. The TBA shall perform the system tests and balance as follows:
 - a. Test and adjust blower RPM to design requirements.
 - b. Test and record motor full load amperes.
 - c. Make pitot tube traverse of main supply ducts and main return air ducts close to RTUs and furnaces, and at each ventilating air duct runout and obtain design cfm at fans and at ventilating air duct runouts to meet Indoor Air Quality standards. This should be compared with airflows measured at air distribution devices to determine duct leakage and actual unit airflows.
 - d. Make pitot tube traverse of ventilating air runout ducts and balance to scheduled CFM values.
 - e. Make pitot tube traverse of outside air intake ducts and balance to scheduled CFM values.
 - f. Test and record system static pressures, suction and discharge.
 - g. Test and adjust system for design supply and recirculated air, cfm.
 - h. Test and adjust system for design outside air and exhaust air, cfm
 - i. Test and record RTU and split system entering air temperatures. (DB heating and cooling.)
 - j. Test and record RTU and split system entering air temperatures. (WB cooling.)
 - k. Test and record RTU and split system cooling and heating entering air temperature at cooling coil upstream face. (DB and WB cooling.)
 - l. Test and record RTU and split system leaving air temperatures. (DB heating and cooling.)
 - m. Test and record RTU and split system leaving air temperatures. (WB cooling.)
 - n. Test and record RTU and split system cooling leaving air temperature at cooling coil downstream face. (DB and WB cooling.)
 - o. Test and record RTU heating leaving air temperature at supply duct discharge connection to RTU and split system.

- p. Test and record outdoor air temperatures. (DB and WB.)
- q. Adjust all main supply, return, and exhaust air ducts to proper design cfm.
- r. Adjust outside air intake for design cfm.
- s. Adjust all zones to proper design cfm for supply, return and exhaust.
- t. After all air distribution devices have been balanced, test and record RTU supply airflow and return airflow using duct traverses close to the RTU supply and return collars and before any supply and return takeoffs to air distribution devices. This should be compared with airflows measured at air distribution devices to determine duct leakage and actual unit airflows.
- u. Test and adjust each diffuser, grille and register to within $\pm 10\%$ of design requirements.
- v. Each grille, diffuser, and register shall be identified as to location and area.
- w. Size, type and manufacturer of diffusers, grilles, registers and tested equipment shall be identified and listed. Manufacturer's ratings on all equipment shall be used to make required calculations.
- x. Readings and tests of diffusers, grilles, and registers shall include required fpm velocity and test resultant velocity, required cfm and test resultant cfm after adjustments. All diffusers, grilles, and registers shall be adjusted to minimize drafts.
- y. Test and record unit heater, electric heater, and makeup air unit entering and leaving air temperatures and associated airflow.
- z. In cooperation with the Control Manufacturer's Representative, setting adjustments of automatically operated dampers to operate as specified, indicated, and/or noted. Testing Agency shall check all controls for proper calibrations and list all controls requiring adjustment by control installers.
- aa. The Contractor shall make any replacements of the pulleys, belts, and dampers or the addition of dampers as required for correct balance as recommended by Air Balance Agency, at no additional cost to the Owner.
- bb. Record HVAC equipment manufacturer, model number, serial number, design airflows, furnace input/ output capacity, and electric heat capacity for all equipment

D. PROCEDURE - PHASE III - CONCLUSIONS AND RECOMMENDATIONS

- 1. After the above phases are completed, the Certified Individual, supervising the testing and balancing shall analyze the data and forward to the Architect-Engineer and Contractor a summary report of all tests performed.

PART 4 SCHEDULES - NOT USED

END OF SECTION

HVAC SYSTEMS INSULATION 23 07 00

PART 1 GENERAL

1.01 SUMMARY

A. GENERAL DESCRIPTION

1. Furnish and install all insulation for HVAC piping, duct and equipment.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. Insulating materials shall be Underwriters' Laboratories rated non-combustible type, and shall comply with flame spread, smoke developed, and other applicable requirements of local and state Fire Codes and NFPA 90A. Before applying any insulation, submit satisfactory evidence of this compliance.
- B. Thermal insulation materials shall meet the property requirements of one or more of the following specifications as applicable to the specific product or end use:
1. American Society for Testing of Materials Specifications:
 - a. ASTM C 1136, "Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation"

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show details for the following:
1. Application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 2. Removable insulation at equipment connections, and access panels.
 3. Application at linkages of control devices.
 4. Field application for each equipment type.
- C. Field quality-control inspection reports.

1.04 QUALITY ASSURANCE

- A. Insulation specified is intended to set a standard. Insulation by other manufacturers will be considered provided that characteristics meet or exceed specified material. Each substitute item shall be submitted for approval.
- B. Specifications apply to supply and associated return system unless specifically specified otherwise.
- C. It is the intent of this Section of the Specifications that all cold surfaces subject to "sweating" be insulated and have a vapor barrier applied.
- D. Furnish insulation thicknesses in excess of that specified herein if so indicated on the drawings.

1.05 SYSTEM DESCRIPTION

A. EXTENT OF WORK – As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE

A. Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS/EQUIPMENT

A. HVAC DUCTWORK:

1. RECTANGULAR SUPPLY, RETURN, OUTSIDE AIR, AND TRANSFER AIR DUCTWORK (MAX. DIMENSION 30"): Owens-Corning or Knauf 2.2" thick fiberglass duct wrap with factory-applied flame-retardant foil-reinforced facing (FRK/FSK) 1.5 PCF density. The minimum installed R-value shall be 6.0.
2. ROUND SUPPLY, RETURN, OUTSIDE AIR, AND TRANSFER AIR DUCTWORK: Owens-Corning or Knauf 2.2" thick fiberglass faced duct wrap with factory-applied flame-retardant foil-reinforced Facing (FRK/FSK) 1.5 PCF density. The minimum installed R-value shall be 6.0.
3. RECTANGULAR TRANSFER AIR DUCTWORK (INTERNALLY LINED AND EXTERNALLY WRAPPED): Owens-Corning or Knauf 2.2" thick fiberglass duct wrap with factory-applied flame-retardant foil-reinforced facing (FRK/FSK) 1.5 PCF density. The minimum installed R-value shall be 6.0 for external wrap. Refer to Section 23 31 13 for internal liner. Liner is only acceptable where specifically indicated on the drawings.
4. RECTANGULAR SUPPLY AND RETURN DUCTWORK (MAX. DIMENSION GREATER THAN 30"): Owens-Corning or Knauf 2" with foil scrim kraft (FSK) semi-rigid duct insulation having a minimum density of 3.0 PCF. The minimum installed R-value shall be 6.0.
5. OUTDOOR RECTANGULAR SUPPLY AND RETURN DUCTWORK: Johns Manville rigid closed-cell polyisocyanurate duct board insulation with 2" minimum thickness with foil scrim kraft (FSK) jacket. The minimum installed R-value shall be 8.0. Provide additional layer of tapered insulation on top of duct field-cut to shed rainwater from top of duct. The outdoor insulation shall be provided with a field-applied jacket equal to 3M AdventureClad 1577 CW or Polyguard Alumaguard 60 installed in strict accordance with manufacturer's recommendations.
6. DIFFUSER BACKS: Owens-Corning or Knauf 2.2" thick fiberglass duct wrap with factory-applied flame-retardant foil-reinforced facing (FRK/FSK) 1.5 PCF density. The minimum installed R-value shall be 6.0.

2.02 FINISHES - NOT USED

2.03 ACCESSORIES

A. TAPES

1. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136 and UL listed.
 - a. Width: 3 inches.
 - b. Thickness: 11.5 mils.
 - c. Adhesion: 90 ounces force/inch in width.

- d. Elongation: 2 percent.
 - e. Tensile Strength: 40 lbf/inch in width.
 - f. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
2. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136 a
- a. Width: 3 inches.
 - b. Thickness: 6.5 mils.
 - c. Adhesion: 90 ounces force/inch in width.
 - d. Elongation: 2 percent.
 - e. Tensile Strength: 40 lbf/inch in width.
 - f. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
3. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.
- a. Width: 2 inches.
 - b. Thickness: 6 mils.
 - c. Adhesion: 64 ounces force/inch in width.
 - d. Elongation: 500 percent.
 - e. Tensile Strength: 18 lbf/inch in width.
4. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive and UL listed.
- a. Width: 2 inches.
 - b. Thickness: 3.7 mils.
 - c. Adhesion: 100 ounces force/inch in width.
 - d. Elongation: 5 percent.
 - e. Tensile Strength: 34 lbf/inch in width.

2.04 FABRICATION - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements.

3.02 DELIVERY, STORAGE, AND HANDLING

- A. All of the insulation materials and accessories covered by this specification shall be delivered to the job site and stored in a safe, dry place with appropriate labels and/or other product identification.
- B. The contractor shall use whatever means are necessary to protect the insulation materials and accessories before, during, and after installation. No insulation material shall be installed that has become damaged in any way. The contractor shall also use all means necessary to protect work and materials installed by other trades.
- C. If any insulation material has become wet because of transit or job site exposure to moisture or water, the contractor shall not install such material, and shall remove it from the job site. An exception may be allowed in cases where the contractor is able to demonstrate that wet insulation when fully dried out (either before installation or afterward following exposure to system operating temperatures) will provide installed performance that is equivalent in all respects to new, completely dry insulation. In such cases, consult the insulation manufacturer for technical assistance.
- D. Any duct liner which becomes wet shall be immediately replaced.

3.03 PREPARATION

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

3.04 CONSTRUCTION

A. CONSTRUCTION/INSTALLATION

1. The application of all insulation shall be performed by experienced mechanics, regularly employed in the trade, in a neat and workmanlike manner. Unless otherwise specified to a greater quality, the application of all insulation shall be in accordance with the manufacturer's recommendations.
2. Omit insulation from the following items:
 - a. Exhaust ducts, except where drawings indicate otherwise.
 - b. Where supply and return ductwork is noted to be internally lined, omit ductwrap.
3. Insulation facings shall be acceptable to NFPA Standards 90A and 90B and ASTM C1136.
4. Fiber Glass Duct Wrap Type Insulation
 - a. To be used on round or oval duct or only on rectangular duct with a maximum dimension less than 30."
 - b. Adhere insulation to duct surface with approved adhesive applied in strips approximately 4" wide on approximate 8" centers. In addition, secure insulation to the bottom and/or sides of rectangular duct work with a dimension of 24" and above with mechanical fasteners at not more than 18" on center. Butt circumferential edges of insulation and seal joints with staples at 6" o.c., adhering the flange over each joint, and seam for lap of longitudinal joints. Tape all joints and punctures with 3" wide foil reinforced Kraft tape and vapor seal.
5. Fiber Glass Duct Board Type Insulation
 - a. Impale with speed washers the insulation over welded pins, spaced a minimum of two rows per side at a maximum of 16" o.c. Seal all breaks, punctures, and joints by adhering a 3" wide strip of foil reinforced Kraft tape and vapor seal.
6. Sheet Armaflex
 - a. Apply in accordance with latest edition of Armstrong's "INSTALLATION INSTRUCTIONS TO THE CONTRACTOR." Apply two coats of Armstrong's WB Vinyl Finish with color selected by engineer.
7. Polyisocyanurate Duct Board Type Insulation
 - a. Install per manufacturer's recommendations. Seal all breaks, punctures, and joints by adhering a 3" wide strip of foil reinforced Kraft tape and vapor seal unless otherwise recommended by manufacturer.
8. Outdoor field-applied jackets shall be installed in strict accordance with manufacturer's recommendations.
9. FIELD QUALITY CONTROL - NOT USED

3.05 ADJUSTING, CLEANING, AND PROTECTION OF WORK - NOT USED

PART 4 SCHEDULES - NOT USED

END OF SECTION

HVAC CONTROLS 23 09 00

PART 1 GENERAL

1.01 SUMMARY

A. GENERAL DESCRIPTION

1. Provide all temperature controls in accordance with recommendations of the equipment manufacturers and per the drawings and specifications.
2. Controls shall be low voltage electric or electronic.
3. Provide all wiring, devices, control panels, smoke control override panels, relays, etc. for a complete and operating system. Conduit shall be concealed except in mechanical rooms and chases.
4. All HVAC Control Wiring shall be by HVAC division including 120 VAC power for all control panels, control transformers, relays, etc.
5. Alternative approaches to this system may be considered.

B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES - NOT USED

1.03 SUBMITTALS

A. PRODUCT DATA - NOT USED

B. SHOP DRAWINGS

1. Submit product data on all devices and complete wiring diagrams. Submit product data, control drawings, calculations, etc. for smoke control system as required by IBC 909. See drawings for additional requirements.
2. Provide control drawings framed under glass in equipment room or in a wall mounted cabinet with lock.

1.04 QUALITY ASSURANCE

- A. All wiring shall be in accordance with NEC. Smoke control system wiring shall also be in accordance with IBC 909.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.05 SYSTEM DESCRIPTION

A. EXTENT OF WORK – As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE

A. Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS/EQUIPMENT

A. COMPONENTS

1. General: Unless otherwise indicated, provide manufacturer's standard components as indicated in published data.

B. ELECTRONIC THERMOSTATS:

1. Manufacturer's standard; compatible with Energy Management System where applicable, as described on drawing and in Rooftop Unit Specification. Remote sensors shall be flush mounted minimum 14 gage stainless steel plate type with wall junction box and security screws.

C. RELAYS

1. Switching relays shall be enclosed unless intended to be mounted in a larger electrical enclosure. Relay contact rating shall be adequate for load.

D. TRANSFORMERS

1. Transformers shall be mounted in an electrical enclosure and of adequate VA capacity for load.

E. SMOKE DETECTORS

1. Smoke detectors shall be UL listed and shall be furnished by Div. 23 and installed by Division 23. Smoke detectors shall shut down the respective unit if excessive temperatures or smoke is detected. Smoke detectors shall also cause a visual and audible alarm as required by NFPA 90A. Smoke detectors shall each be provided with a remote wall-mounted alarm and test station.
2. Furnish control components as required by control sequences specified.
3. Smoke detectors are to be provided in the return duct of each rooftop unit.

2.02 FINISHES - NOT USED

2.03 ACCESSORIES - NOT USED

2.04 FABRICATION - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements.

3.02 DELIVERY, STORAGE, AND HANDLING - NOT USED

3.03 PREPARATION - NOT USED

3.04 CONSTRUCTION

A. INSTALLATION

1. Install controls and materials in accordance with manufacturer's instructions, rough-in drawings, plans and specifications.

2. Wiring shall be done in accordance with NEC and Division 26 of these specifications.
 3. All wire shall be in conduit and devices mounted on appropriate electrical boxes. Conduit shall be concealed except in mechanical rooms and chases.
 4. All wire shall be color coded in accordance with industry standards. Use number code on wire if required to avoid confusion.
 5. Set heat anticipators properly, where applicable.
 6. Instruct Owner's personnel in operation of control system.
 7. Where controls are accessible for adjustment by building occupants (those with clear plastic guards), mount controls 48" above finished floor.
- B. CONTROL SEQUENCES - COORDINATION WITH OTHER WORK**
1. **SPLIT SYSTEM FURNACES & AIR-COOLED CONDENSING UNITS.**
 - a. A 7-day programmable thermostat with a separate space temperature setpoint adjustment, digital display and with a remote wall mounted sensor cycles compressors and gas heat to maintain space temperature set point.
 - b. During programmed occupied periods, the furnace supply fan shall be programmed for or switched to the "Auto" mode for supply fan cycles with the heating or cooling requirements of the space. During programmed unoccupied periods, the RTU supply fan shall be programmed to run in the "auto" mode so that the supply fan cycles with the heating and cooling requirements of the space. The Owner shall have the ability to change occupied fan operation from "auto" to "on". During normal operation, the System switch should be set to the "Auto" position for automatic changeover from heating to cooling.
 - c. The unit's motorized outside air intake damper shall open whenever the unit's supply fan is operating in the occupied mode. The unit's motorized outside air intake damper shall close whenever the unit's supply fan is operating in the unoccupied mode. The outside air intake damper shall close whenever the unit is off.
 2. **ROOFTOP UNIT RTU-1.**
 - a. A 7-day programmable wall-mounted unit controller with a digital display and with a remote wall mounted space temperature sensor with setpoint adjustment and unoccupied override cycles compressors and gas heat to maintain space temperature set point. Provide multi-stage cooling and heating for RTUs that have multiple compressors or multiple stages of heating. Humidity controls including a humidity sensor located in the return air stream, temperature & humidity sensors in the outside air stream, and a temperature sensor in the supply air stream shall cut on the lead compressor and shall modulate the hot gas reheat valve to maintain a space relative humidity setpoint of 50%RH (adjustable). Unit controller shall be used for programming and scheduling.
 - b. During programmed occupied periods, the RTU's supply fan shall be programmed in the "on" mode for continuous supply fan operation. During programmed unoccupied periods, the RTU supply fan shall be programmed to run in the "auto" mode so that the supply fan cycles with the heating and cooling requirements of the space. The Owner shall have the ability to change occupied operation from "on" to "auto". The RTU shall be programmed for single zone VAV operation to vary fan speed to meet space temperature and humidity setpoint.
 - c. The unit's motorized outside air intake damper shall open whenever the unit's supply fan is operating in the occupied mode. The unit's motorized outside air intake damper shall close whenever the unit's supply fan is operating in the unoccupied mode. The outside air intake damper shall close whenever the unit is off. A CO2 sensor in the return

airstream shall modulate the outside air damper between 105 CFM and the scheduled outside air quantity of 420 CFM as required to maintain a maximum 1,000 ppm CO₂ concentration.

- d. Units provided with an economizer shall have differential enthalpy controls and shall operate based on the unit manufacturer's recommended sequence of operation.
3. EXHAUST FANS EF-1, EF-2, EF-3, and EF-4.
 - a. Exhaust Fan EF-1 shall be interlocked with a light switch.
 - b. Exhaust Fan EF-2 shall be interlocked with a light switch.
 - c. Exhaust Fan EF-3 shall be interlocked with a light switch.
 - d. Exhaust Fan EF-4 shall be interlocked with a light switch.
 4. ELECTRIC HEATERS.
 - a. Unit mounted thermostat shall cycle fan and sequence stages of heating to maintain thermostat setpoint of 55 deg.F (adjustable).
 5. GENERAL.
 - a. Provide other controls as specified with equipment. See Division 23 specifications and drawings for additional requirements.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: All low-pressure duct work (1" SPWG Class Construction or as indicated on the drawings) including supply, return, exhaust, outside air, and other special ducting, flues, vents, or chimneys to complete the systems as shown on the drawings or specified herein. Duct construction and sealing requirements shall comply with the 2021 International Energy Conservation Code.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.
- C. DEFINITIONS
 - 1. Diffusers: Circular, square, or rectangular air distribution outlet, generally located in the ceiling and comprised of deflecting members discharging supply air in various directions and planes and arranged to promote mixing of primary air with secondary room air.
 - 2. Grille: A louvered or perforated covering for an opening in an air passage, which can be located in a sidewall, ceiling or floor.
 - 3. Register: A combination grille and damper assembly over an air opening.

1.02 REFERENCES

- A. ASHRAE – Handbook 1997 Fundamentals; Chapter 32 – Duct Design.
- B. ASHRAE – Handbook 2000 HVAC Systems and Equipment; Chapter 16 – Duct Construction.
- C. ASTM A 90 – Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
- D. ASTM A 167 – Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- E. ASTM A 525 – General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
- F. ASTM A 527 – Steel Sheet, Zinc-Coated (Galvanized) by Hot-Dip Process, Lock Forming Quality.
- G. NRPA 90A – Installation of Air Conditioning and Ventilating Systems.
- H. NFPA 91 Exhaust Systems
- I. NFPA 92A and 92B – Smoke Control and Smoke Management
- J. NFPA 96 – Commercial Cooking Operations.
- K. SMACNA – HVAC Duct Construction Standards
- L. UL 181 – Factory-Made Air Ducts and Connectors.

1.03 SUBMITTALS

- A. PRODUCT DATA: For each model indicated, include the following:
 - 1. Data Sheet: For each type of air outlet and inlet, and accessory furnished: indicate construction, finish, and mounting details.

2. Performance Data: Include throw and drop, static-pressure drop, and noise ratings for each type of air outlet and inlet.
3. Schedule of diffusers, registers, and grilles indicating drawing designation, room location, quantity, model number, size, and accessories furnished.
4. Assembly Drawing: For each type of air outlet and inlet; indicate materials and methods of assembly of components.
5. Submit the following:
 - a. Air distribution devices and accessories, including louvers.
 - b. Smoke and Fire dampers and doors.
 - c. Flexible duct.
 - d. Flexible connections.
 - e. Damper hardware.
 - f. Multi-blade dampers.
 - g. Access doors.
 - h. Turning vanes.
 - i. Special ducting, flues, vents, and chimneys and grease ducts.
 - j. And other specified equipment.

B. SHOP DRAWINGS

1. Coordination Drawings: Provide reflected ceiling plans and wall elevations drawn to scale to show locations and coordination of diffusers, registers, and grilles with other work installed in ceilings and walls and submit for approval. See Section 01 31 13, Par. 1.07 for other requirements.

C. SAMPLES

1. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for diffusers, registers, grilles, and louvers with factory-applied color finishes.
2. Samples for Verification: Of Diffusers, registers, grilles, and louvers in manufacturer's standard sizes, showing the full range of colors. Prepare Samples from the same material to be used for the work.

1.04 QUALITY ASSURANCE

A. QUALIFICATIONS

1. NFPA Compliance:
 - a. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
 - b. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

- B. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- C. Fire dampers, smoke dampers, combination fire/smoke dampers and ceiling dampers located within air distribution and smoke control systems shall be installed in accordance with (Section 716) and the manufacturer's installation instructions and listing (IBC 716.2).
- D. Ducts and air transfer openings in fire barriers shall be protected with approved fire dampers installed in accordance with their listing with exceptions (IBC 716.5.2).

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK – As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE

- A. Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS/EQUIPMENT

- A. GENERAL: Non-combustible or conforming to requirements for Class 1 air duct materials, or UL 181.

- B. STEEL DUCTS: ASTM A525 or ASTM A527 galvanized steel sheet, lock-forming quality, having zinc coating of 1.25 oz per sqft for each side in conformance with ASTM A90.

1. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.

C. FLEXIBLE DUCTS

1. Insulated-Duct Connectors: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; aluminized vapor barrier film.

a. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.

b. Maximum Air Velocity: 4000 fpm.

c. Temperature Range: Minus 10 to plus 160 deg F.

d. Minimum R-value equal to 6.0.

2. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 through 18 inches to suit duct size.

a. Maximum installed length is 4'-0"

D. SEALANT MATERIALS

1. Joint and Seam Tape: 2 inches wide; glass-fiber-reinforced fabric.

2. Tape Sealing System: Woven-fiber tape impregnated with gypsum mineral compound and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.

3. Solvent-Based Joint and Seam Sealant: One-part, non-sag, solvent-release-curing, polymerized butyl sealant formulated with a minimum of 75 percent solids.

4. Flanged Joint Mastic: One-part, acid-curing, silicone, elastomeric joint sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

5. Flange Gaskets: Butyl rubber or EPDM polymer with polyisobutylene plasticizer.

- E. HANGER RODS: Steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

F. DAMPERS:

1. BACKDRAFT DAMPERS Multiple-blade, parallel action gravity balanced, with center-pivoted blades of maximum 6-inch width, with sealed edges, assembled in rattle-free manner with 90-degree stop, steel ball bearings, and axles; adjustment device to permit setting for varying differential static pressure.

- a. Frame: 0.052-inch-thick, galvanized sheet steel, with welded corners and mounting flange.
 - b. Blades: 0.050-inch-thick aluminum sheet.
 - c. Blade Seals: Neoprene.
 - d. Blade Axles: Galvanized steel.
 - e. Tie Bars and Brackets: Galvanized steel.
 - f. Return Spring: Adjustable tension.
2. VOLUME DAMPERS: Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include indexed locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class. Provide with standoff bracket when mounted in insulated duct.
- a. Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.
 - i) Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 0.064-inch-thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
 - ii) Roll-Formed Steel Blades: 0.064-inch-thick, galvanized sheet steel.
 - iii) Blade Axles: Galvanized steel.
 - iv) Bearings: Oil-impregnated bronze or Molded synthetic.
 - v) Tie Bars and Brackets: Galvanized steel.

2.02 FINISHES - NOT USED

2.03 ACCESSORIES - NOT USED

2.04 FABRICATION

A. DUCT SEALING AND PRESSURE CLASS

1. Static-Pressure Classes, Seal Classes, and Leakage Classes: Unless otherwise indicated, construct ducts according to the following:
 - a. 1-inch w.g. Pressure Class, Seal Class C, Rectangular Leakage Class 24, Round Leakage Class 12:
 - i) Supply ductwork.
 - ii) Return ducts.
 - iii) Exhaust ducts.
 - iv) Outside air ducts.

B. RECTANGULAR DUCT FABRICATION

1. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
 - a. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
 - b. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
2. Transverse Joints: Prefabricated slide-on joints and components constructed using manufacturer's guidelines for material thickness, reinforcement size and spacing, and joint reinforcement.

3. Formed-On Flanges: Construct according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," Figure 1-4, using corner, bolt, cleat, and gasket details.
 - a. Duct Size: Maximum 30 inches wide and up to 2-inch wg pressure class.
 - b. Longitudinal Seams: Pittsburgh lock sealed with non-curing polymer sealant.
4. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359-inch-thick or less, with more than 10 sq. ft. of non-braced panel area unless ducts are lined.
5. Internal Duct Liner for transfer air ducts: Provide minimum 1" thickness flexible edge-coated mat-faced insulation made from inorganic glass fibers bonded by a thermosetting resin. Duct liner shall be faced with a tightly bonded matt providing the airstream side a smooth tough surface. Liner shall meet NFPA 90A & 90B Standards, have a 25 flame spread/ 50 smoke developed rating, with a minimum 6000 fpm air velocity rating.

C. FLEXIBLE CONNECTIONS

1. Flexible connections shall be made from "VENTGLAS", Neoprene coated glass fabric.

D. DAMPER HARDWARE

1. Dampers on exposed duct with shaft length of 12" or less shall be equipped with "VENTLOCK" #620 1/4" dial regulator; with shaft length of 12" to 20" with "VENTLOCK" #653 3/8" dial regulators and 607 end bearings.
2. Larger dampers shall be controlled with "VENTLOCK" self-locking regulators #640 or #641 in 3/8" or 1/2" size and shall be installed with #607 end bearings.
3. Damper operators on inaccessible finished ceilings shall be equipped with "VENTLOCK" #688 flush mounting concealed damper regulators.
4. Equivalent damper hardware by Young Regulator is acceptable.

E. ACCESS DOORS

1. Provide access doors for adequate accessibility to dampers and other devices concealed within walls, inaccessible ceilings and chases.
 - a. Access doors to 16" x 24" size shall be "VENTLOCK" stamped insulated access doors, 22-gage paintable galvanized steel.
 - b. Larger access doors shall be double panel construction with 1" rigid insulation between panels. Doors with largest dimension over 24", but less than 48", shall use "VENTLOCK" series 200 latches, hinges and gasketing, and construction shall be 22-gage paintable galvanized steel. Doors with largest dimension over 48", shall use "VENTLOCK" series 300 latches, hinges and gasketing, and construction shall be 20-gage paintable galvanized steel.
 - c. All access doors in **Detention** areas shall be 12-gage paintable galvanized steel door and frame, with continuous piano hinge. Detention access doors to be "KEES Standard Security Access Panels, Model SSP," or equivalent.
 - d. Access doors shall be UL listed where fire-proofing membranes are penetrated.
 - e. Equivalent access doors by Kees or Air Balance are acceptable.

F. INSULATED ACOUSTICAL FLEXIBLE DUCT

1. Provide where indicated on drawings Flexmaster Type 8M, UL 181 Class 1 flexible duct with minimum R-value equal to 6.0. Duct length shall not exceed sixty (48) inches or as indicated on the drawings. Duct shall not penetrate firewalls and shall not be used within five (5) feet of any unprotected fire wall penetration. Flexible ductwork shall not be used as elbows, transitions, or offsets in ducts.

2. The duct shall be constructed of a CPE fabric supported by helical wound galvanized steel. The fabric shall be mechanically fastened to the steel helix without the use of adhesives.
3. The internal working pressure rating shall be at least as follows with a bursting pressure of at least 2 1/2 times the working pressure:
 - a. Positive: 6 inches w.g.
 - b. Negative: 4 inches w.g.
 - c. The duct shall be rated for a velocity of at least 4000 feet per minute.
 - d. Suitable for operating temperature range of -20°F to +250°F.
4. Factory insulate the flexible duct with fiberglass insulation. The R-value shall be at least 4.2 at a mean temperature of 75°F.
5. Cover the insulation with a fire-retardant metalized vapor barrier jacket reinforced with cross-hatched scrim having a permeance of not greater than 0.05 perms when tested in accordance with ASTM E96, Procedure A.

G. AIR DISTRIBUTION DEVICES

1. GENERAL:

- a. All outlet grilles shall have gaskets.
- b. Unless otherwise noted, sidewall devices and ceiling devices shall be off-white baked enamel.
- c. Furnish opposed blade volume control dampers on supply, return, and exhaust devices, where indicated.
- d. Where device is to lay in a tee bar ceiling, verify grid dimensions. Device shall be square with nominal dimension of side same as shorter grid dimension. That is, provide 24" x 24" nominal panel with 24" x 48" grid, etc.
- e. Ceiling devices shall be compatible with ceiling construction.
- f. Test devices in accordance with ASHRA 70.

H. DEVICES:

1. Devices shall be by Carnes, Krueger, Metalaire, Price Industries or Titus.
2. Perforated face diffusers with pattern controllers on the face will not be accepted.

I. TURNING VANES

1. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes.
2. Manufactured Turning Vanes: Fabricate 1-1/2-inch-wide, single-vane, curved blades of galvanized sheet steel set 3/4 inch o.c.; support with bars perpendicular to blades set 2 inches o.c.; and set into vane runners suitable for duct mounting.
 - a. Manufacturers:
 - i) Ductmate Industries, Inc.
 - ii) Duro Dyne Corp.
 - iii) METALAIRE, Inc.
 - iv) Ward Industries, Inc.
 - b. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

J. MULTI-BLADE DAMPERS

1. Two-position control dampers may be parallel blade type. Modulating or balancing dampers shall be opposed blade type.
2. Motorized outside air dampers shall have vinyl or stainless steel blade seals and stainless steel jamb seals.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements.
- B. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 DELIVERY, STORAGE, AND HANDLING - NOT USED

3.03 PREPARATION - NOT USED

3.04 CONSTRUCTION/INSTALLATION

A. GENERAL

1. All ductwork not specifically indicated on drawings or specified elsewhere to be medium- or high-pressure duct shall be fabricated, braced and erected in accordance with SMACNA " HVAC Duct Construction Standards" at the SPWG Class Construction specified in 1.01 previously or the latest edition of ASHRAE "Handbook".
2. Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
3. Adhere to drawings as closely as possible. However, where required to meet structural or other interferences, vary the run and shape of ducts and make offsets during progress of work. Offsets and transitions shall be made at 45 degrees or less. Duct routes shall be established and field measurements shall be taken before ductwork is fabricated. Coordinate where pipes or other items are placed around the item. If duct collars obstruct more than 10% of the cross sectional area, the duct shall be enlarged to accommodate obstruction.
4. All changes of direction and elbows shall be fitted with turning vanes. Radius elbows shall be used if space permits. Refer to Fig. 2-2, SMACNA "Duct Construction Standards". Types RE1, RE 2, RE 3 and RE 5 are acceptable. Type RE 4, RE6 thru RE10 shall NOT be used. Mitered elbows greater than 40 degrees shall have turning vanes.
5. Branch duct take-offs shall be flared, cone, or wye type.
6. Ductwork shall be free of any objectionable self-generating noise or rattles.
7. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pitot tube openings where required for testing of system, 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.

8. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
9. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
10. Install backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
11. Install volume dampers in ducts with liner; avoid damage to and erosion of duct liner.
12. Provide balancing dampers at points on supply, return, and exhaust systems where branches lead from larger ducts as required for air balancing. Install at a minimum of two duct widths from branch takeoff.
13. Provide test holes at fan inlets and outlets and elsewhere as indicated.
14. Provide transfer air ducts with internal duct liner. Install duct liner with adhesive and mechanical fasteners per manufacturer's recommendations.

B. ACCESS DOORS

1. Access doors shall be provided at all dampers, equipment in duct and as shown on drawings.
2. Downstream from volume dampers, turning vanes, and equipment.
3. Adjacent to fire or smoke dampers, providing access to reset or reinstall fusible links.
4. To interior of ducts for cleaning; before and after each change in direction, at maximum 50-foot spacing.
5. On sides of ducts where adequate clearance is available.
6. Access doors shall be minimum of 10" x 12" unless a larger size is required for maintenance of equipment or a smaller size must be used because of small duct size.
7. Provide access doors in walls and inaccessible ceilings where needed for equipment, valve, and condensate drain trays access.

C. FLEXIBLE DUCT INSTALLATION

1. Install without sharp bends, sags or dips. Install to the shortest practical length.
2. Secure to rigid duct and diffuser neck with minimum of two bands; one for the flexible duct and one for the insulation covering.

D. SEALING

1. Seal all duct joints to the seal class in SMACNA Table 1-2 based on the construction class specified in 1.01 previously but the minimum seal class for all ductwork shall be seal class "C."

E. FLEXIBLE CONNECTIONS INSTALLATION

1. Furnish and install flexible connections on the inlet and outlet of each fan and unit to which duct connections are made.
2. At least 1" slack shall be allowed in these connections to insure that no vibration is transmitted from fan to ductwork.

3. The fabric shall either be folded in with the metal or attached with metal collar frames at each end to prevent air leakage.

F. LOUVERS INSTALLATION

1. Recess louvers in face brick walls approximately 0.25."
2. Mount units rigidly to walls and make weatherproof. Set brick vents and brick louvers in place during masonry erection.

G. INSTALLATION OF DIFFUSERS, REGISTERS, AND GRILLES

1. Install diffusers, registers, and grilles level and plumb, according to manufacturer's written instructions. Coordination Drawings, original design, and reference standards.
2. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of the panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
3. Install diffusers, registers, and grilles with airtight connection to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

H. LOW PRESSURE DUCTWORK

1. Fabricate and support in accordance with SMACNA 1" SPWG Class Construction Duct Construction Standards and ASHRAE handbooks, except as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
2. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide air foil turning vanes. Where acoustical lining is indicated, provide turning vanes of perforated metal with glass fiber insulation.
3. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees.
4. Provide easements where low pressure ductwork conflicts with piping and structure. Where easements exceed 10 percent duct area, split into two ducts maintaining original duct area.
5. Use double nuts and lock washers on threaded rod supports.

3.05 FIELD QUALITY CONTROL

A. MANUAL BALANCING DAMPERS

1. All low pressure branch ducts on either supply, return or exhaust shall be provided by some means of balancing in addition to dampers at registers and diffusers where indicated.
2. Splitter dampers shall be made of at least the same thickness material as duct (minimum thickness 22-gauge). They shall be securely hinged at air leaving edge and made of 2 thicknesses so that entering edge presents a rounded surface to airflow. Provide splitter dampers only where indicated.

3. Butterfly dampers up to 18" wide shall be made of minimum 22-gauge galvanized steel. Dampers up to 48" wide shall be made of minimum 16-gauge galvanized steel. Butterfly dampers may be used in ducts with heights up to 10". Dampers that require blades over 10" high shall be multi-blade louver dampers. Refer to Fig. 2-12 and 2-13, SMACNA "Duct Construction Standards", First Edition, 1985. Fig. D shall NOT be used.
4. Multi-blade louver dampers used for balancing shall be of the opposed blade type. Damper blades shall be constructed of 16-gauge steel. Individual blade width shall not exceed 10" and blade length shall not exceed 48".
5. All dampers shall be so constructed and installed that there shall be no vibration due to airflow over damper.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

A. If the ends of the ducts are not covered during construction the contractor shall clean duct systems with high power vacuum machines. Protect equipment which may be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.

B. ADJUSTING

1. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

C. CLEANING

1. After installation of diffusers, registers, and grilles, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers, registers, and grilles that have damaged finishes.

PART 4 SCHEDULES – NOT USED

END OF SECTION

HVAC EQUIPMENT 23 36 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Furnish and install all required equipment, appurtenances, electrical disconnects (fused as necessary), motor starters, and accessories for a complete heating and/or cooling system.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. All equipment furnished for this project shall comply with applicable requirements of ASHRAE Standard 90.1-2010, ASHRAE Standard 62, and the 2009 International Energy Conservation Code.
- B. NFPA 96 – Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
- C. NFPA 17A – Standard for Wet Chemical Extinguishing Systems.
- D. See other sections of these specifications that may specify accessories or features.
- E. Refer to the schedules and notations on the drawings where equipment capacities are not included in this section.
- F. Review other sections of the specifications and the plans for services required to each piece of mechanical equipment. Any required accessories, appurtenances, or service omitted from the plans or specifications that is not called to the attention of the Architect-Engineer at least 72 hours before bidding and corrected by addendum shall be provided as though shown.

1.03 SUBMITTALS

- A. Product Data: Submit all equipment for approval.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection. Prepare the following by or under the supervision of a qualified professional engineer:
 - 1. Design Calculations: Calculate requirements for selecting vibration isolators and for designing vibration isolation bases.
 - 2. Detail mounting, securing, and flashing of roof curb to roof structure. Indicate coordinating requirements with roof membrane system.
 - 3. Wiring Diagrams: Power, signal, and control wiring.
- C. Warranty: Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components of rooftop air conditioners that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Compressors: Manufacturer's standard, but not less than five years from date of Substantial Completion. Warranty shall include loss of oil.

2. Warranty Period for Heat Exchangers: Manufacturer's standard, but not less than 10 years from date of Substantial Completion.
3. Warranty Period for Control Boards: Manufacturer's standard, but not less than five years from date of Substantial Completion.

D. Close Out Documents - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

1.04 QUALITY ASSURANCE

A. QUALIFICATIONS

1. All electrical components shall have E.T.L. and C.G.A. Listing. All wiring shall be in compliance with NEC and CEC.
2. INDOOR AIR QUALITY PROVISIONS
 - a. Equipment provided shall comply with requirements set forth in the 2009 International Mechanical Code.
 - b. Evaporator coil drain pans shall be self-draining to prevent standing water.
 - c. All HVAC equipment that handles moving air shall have provisions for easy accessibility for in-situ cleaning and inspection of all moving parts and interior areas. "Easy Accessibility" includes hinged access panels when available as options and other approved reasonable and convenient means of access.
 - d. Maintain minimum ten (10) foot separation between exhaust terminations and OA intakes, windows and doors.
 - e. All refrigeration compressors shall carry manufacturer's standard 5-year warranty

1.05 SYSTEM DESCRIPTION

A. EXTENT OF WORK – As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE

A. Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. FANS

1. Power Roof Ventilators
 - a. Ventilators shall be of the centrifugal belt or direct driven type as indicated and shall be UL (705) listed. Motor compartments shall be constructed of heavy gauge aluminum mounted on an independent support structure. Fan hoods shall have a rolled bead for added strength. Wheel shall overlap spun venturi and have backward inclined blades. Wheels shall be statically and dynamically balanced. Complete drive assembly, including motor and wheel shall be mounted on vibration isolators. Motors and drives shall be isolated from the air stream. Air for cooling the motor shall be isolated from a location free from discharge contaminants. Shafts of belt drive units shall be ground, polished, coated with a rust inhibitive finish and mounted in heavy duty pillowblock bearings with L50 200,000 hour regreasable ball bearings in a cast iron housing. Drives shall be selected for a minimum of 150% of driven horsepower, and have

oil-resistant belts with 25,000 hours average life. Sheaves shall be adjustable pitch, machined cast iron, keyed to shafts.

2. CEILING EXHAUST FANS

- a. Ceiling-mounted centrifugal fans shall consist of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, mounting brackets, and accessories. Housing shall be split, spun aluminum with aluminum straightening vanes, outlet flange, and support bracket for ceiling mounting. Direct-drive units shall have motor encased in housing outside of airstream, factory wired to disconnect switch located in fan housing. Fan wheels shall be aluminum with airfoil blades welded to an aluminum hub.

3. Quality Control

- a. All fans shall bear the AMCA Certified Ratings Seal for both air and sound performance.
- b. Subject to compliance with requirements, provide fans as manufactured by one of the following:
 - i. Acme Engineering and Manufacturing Corp.
 - ii. Carnes Co., Inc.
 - iii. Loren Cook Co.
 - iv. Greenheck Fan Corp.
 - v. Twin City Fans

B. ROOF TOP UNITS

1. GENERAL:

- a. Smoke detectors are furnished by Division 26, and shall be installed by Division 23. See Division 23.
- b. Furnish and install hail guards, blower proving switch, and high efficiency motor. See drawings for additional requirements.
- c. See drawings for additional requirements.
- d. Options:
 - i. Lead circuits shall be provided with hot gas bypass where indicated on the schedules.
 - ii. Unit shall be provided with a hot gas reheat coil and hot gas reclaim valve piped to the lead refrigerant system where indicated on schedules.
 - iii. Anti-recycle relay for compressors shall be provided.
 - iv. Unit shall be provided with economizer where scheduled.

2. Rooftop units without heat recovery

- a. Description: Factory assembled and tested; designed for exterior installation; consisting of compressor, indoor and outside refrigerant coils, indoor fan and outside coil fan, refrigeration and temperature controls, filters, and dampers.
- b. Casing: Galvanized-steel construction with enamel paint finish, removable panels or access doors with neoprene gaskets for inspection and access to internal parts, minimum 1/2-inch thick thermal insulation, knockouts for electrical and piping connections, exterior condensate drain connection, and lifting lugs.
- c. Indoor Fan: Forward curved, centrifugal, belt driven by single-speed motor.
- d. Outside Coil Fan: Propeller type, directly driven by motor.
- e. Refrigerant Coils: Aluminum-plate fin and seamless copper tube in steel casing with equalizing-type vertical distributor.
- f. Compressor: Scroll compressor with integral vibration isolators, internal overcurrent and over temperature protection, internal pressure relief, and crankcase heater.
- g. Refrigeration System:
 - i. Compressor.
 - ii. Outside coil and fan.

- iii. Indoor coil and fan.
- iv. Four-way reversing valve and suction line accumulator.
- v. Expansion valve with replaceable thermostatic element.
- vi. Refrigerant dryer.
- vii. High-pressure switch.
- viii. Low-pressure switch.
- ix. Thermostat for coil freeze-up protection during low-ambient temperature operation or loss of air.
- x. Low-ambient controls (where indicated on schedule).
- xi. Brass service valves installed in discharge and liquid lines.
- h. Filters: 2-inch-thick, pleated, MERV-8 throwaway filters in filter rack. Provide 3 sets for each unit.
- i. Heat Exchanger: Aluminized-steel construction for LP gas-fired burners with the following controls:
 - i. Redundant single or dual gas valve with manual shutoff.
 - ii. Direct-spark pilot ignition.
 - iii. Electronic flame sensor.
 - iv. Induced-draft blower.
 - v. Flame rollout switch.
- j. Motorized Outside-Air Damper: Linked damper blades with manual slide and spring-return damper motor and hood.
- k. Power Connection: Provide for single point connection of power to unit with unit-mounted disconnect switches accessible from outside unit and control-circuit transformer with built-in circuit breaker.
- l. Unit Controls: Solid-state control board and components contain at least the following features:
 - i. Indoor fan on/off delay.
 - ii. Default control to ensure proper operation after power interruption.
 - iii. Service relay output.
 - iv. Unit diagnostics and diagnostic code storage.
 - v. Field-adjustable control parameters.
 - vi. Dehumidification control with humidistat where indicated on plans.
 - vii. Gas valve delay between first- and second-stage firing.
 - viii. Low-ambient control, allowing operation down to 0 deg F (minus 18 deg C).
 - ix. Minimum run time.
 - x. Night setback mode.
 - xi. Return-air temperature limit.
 - xii. Low-refrigerant pressure control.
- m. Thermostat: See Drawings
- n. Accessories:
 - i. Service Outlets: Two, 115-V, ground-fault, circuit-interrupter type (where indicated).
 - ii. Coil guards of painted, galvanized-steel wire.
 - iii. Power exhaust fan where indicated.
 - iv. Hinged access doors.
 - v. Hot gas reheat coil and controls where scheduled.
- o. Roof Curb: Steel with corrosion-protection coating, gasketing, and factory-installed wood nailer; complying with NRCA standards; minimum height of 18 inches. Curbs shall be constructed to keep unit level on a sloped roof. Provide with security bars at all roof penetrations (where scheduled).
- p. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - i. AAON, Inc.
 - ii. Daiken.
 - iii. Lennox Industries Inc.
 - iv. Trane Company.

- v. JCI (YORK) International Corporation.
- vi. Greenheck
- vii. Valent

3. MOTOR CONTROLLERS (GENERAL)

- a. Single phase motors shall have starters furnished herein which shall be manual type with stainless steel plate and pilot lights unless otherwise indicated. Where single phase motors are scheduled with built-in overload protection, no starter is required.
- b. Starters for three phase motors unless indicated otherwise shall be magnetic across-the-line type with three solid state overloads, phase loss protection, combination disconnect switch, pilot lights, auxiliary contacts, hand-off-auto switches, and shall have 120-volt control transformer individually, fused from the line side of the starter using two cartridge fuses. Transformer fuses shall be sized to carry the holding coil circuit and other connected devices.
- c. All motor starters not enclosed in unit housing shall be in NEMA 1 enclosure when mounted indoors, and in NEMA 4 enclosure when mounted on exterior.
- d. Combination starters shall contain circuit breakers sized in accordance with the NEC Table 430-152.
- e. Starters shall be labeled with engraved plastic nameplate describing the equipment served, e.g. "AHU1". Nameplates shall be attached with screws or rivets. Adhesives shall not be used to secure the nameplates.
- f. Starter mounted push-button station, selector switches, and pilot lights shall be manufacturer's standard unit and oil-tight. Push-button station shall be monetary contact type unless otherwise designated with green start button, red stop button, and a legend plate. Selector switches shall be standard knob maintained contact type with legend plates. Pilot lights shall be 120-volt lamps with green glass color cap.
- g. Refer to Division 26, for additional motor controller requirements.
- h. Coordinate starter requirements for auxiliary contacts with Division 23 and 26, with maximum of two auxiliary contacts for each starter.
- i. Starters shall be manufactured by Allen Bradley, Square D, Cutler Hammer, Furnas or General Electric. Starters from these manufacturers shall equal Square D, Class 8536.

4. SPLIT SYSTEM FURNACES AND AIR-COOLED CONDENSING UNITS

- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - i. Carrier Air Conditioning; Div. of Carrier Corp.
 - ii. Bryant.
 - iii. Trane Co. (The); Unitary Products Group.
 - iv. York International Corp. (Johnson Controls).
 - v. Lennox.
- b. VERTICAL-MOUNTED, EVAPORATOR-FAN COMPONENTS
 - i. Cabinet: Enameled steel with removable panels on front and ends.
 - a) Discharge and return collars for duct connection.
 - b) Insulation: Faced, glass-fiber, duct liner.
 - c) Drain Pans: Polymer, with connection for drain; insulated.
 - d) Return air base where indicated.
 - ii. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.
 - iii. Fan and motor for units of 5-ton and less capacity: Centrifugal fan with three speed motor and controller with overload protection, resiliently mounted.
 - iv. Filters: 1" thick pleated with minimum MERV 8 Rating.
 - v. Gas Heating Section: High efficiency Category IV listed induced combustion natural gas furnace. Stainless steel heat exchanger, inshot-type burners,

- single or two-stage gas control as scheduled, air flow providing device, spark ignition, and flame proving controls.
 - vi. Units shall be provided with all necessary controls, fan relays, terminal blocks, control transformers, fan drives, etc. and shall be provided with rubber-in-shear isolation pads.
 - vii. Unit shall be U.L. listed and shall have a one point power connection.
 - viii. Provide with condensate neutralization kit and refill media.
 - ix. Provide with vent kit including flue and combustion air intake caps, flashing and storm collars for metal roof.
 - c. AIR-COOLED, COMPRESSOR-CONDENSER COMPONENTS
 - i. Casing: Steel, finished with baked enamel for weather protection, with removable panels for access to controls, weep holes for water drainage, mounting holes in base, and louvered side panels. Provide brass service valves, fittings, and gage ports on exterior of casing.
 - ii. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, contactor, and vibration isolation.
 - a) Compressor Type: Scroll.
 - b) Compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
 - c) Provide liquid line dryer
 - d) Provide evaporator defrost control.
 - e) For heat pump systems, provide heat pump type unit and reversing relay.
 - iii. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid sub-cooler.
 - iv. Fan: Outdoor Compressor-Condenser Unit: Aluminum-propeller type, directly connected to motor.
 - v. Motor: Permanently lubricated, with integral thermal-overload protection.
 - vi. Low Ambient Kit: For heat pump systems, provide low ambient kit permitting operation down to 0 deg. F.
 - vii. Unit shall be completely factory-wired with necessary controls and contactor pressure lugs or terminal block for power wiring. Control wiring shall be 24 volt control circuit and shall include fusing and control transformer. Unit shall provide external location for mounting a fused disconnect device.
 - viii. The unit manufacturer shall size the refrigerant piping and shall submit shop drawings showing pipe sizes, fittings, traps, etc. as recommended by the manufacturer. The installing contractor shall provide the interconnecting copper tubing and shall charge the system with refrigeration accordance with manufacturer's instructions.
 - ix. Provide hard start kit for single-phase units.
 - x. Unit shall be U.L. listed.
 - xi. Provide automatic-reset timer to prevent rapid cycling of compressor. Provide high and low refrigerant pressure switches.
 - xii. Provide condensate overflow switches. See drawings for locations.
 - xiii. Provide auxiliary drain pans where required.
 - xiv. Refrigerant filter-dryer.
 - xv. See equipment schedule remarks for additional requirements.
5. SEE DRAWINGS FOR ADDITIONAL EQUIPMENT.
6. Access Doors: Provide access doors for adequate accessibility to equipment and devices concealed within inaccessible ceilings, walls, and chases. Access doors shall be minimum 10" x 12" size.

- a. Access doors to 16" x24" size shall be "VENTLOCK" stamped insulated access doors, 22-gauge paintable galvanized steel.
- b. Larger access doors shall be double panel construction with 1" grid insulation between panels. Doors with largest dimension over 24", but less than 48", shall be "VENTLOCK" series 200 latches, hinges and gasketing, and construction shall be 22-gage paintable galvanized steel. Doors with largest dimension over 48", shall use "VENTLOCK" series 300 latches, hinges and gasketing, and construction shall be 20-gage paintable galvanized steel.
- c. All access doors in Detention areas shall be 12-gage paintable galvanized steel door and frame, with continuous piano hinge. Detention access doors to be "KEES Standard Security Access Panels, Model SSP," or equivalent.
- d. Access doors shall be UL listed where fire-proofing membranes are penetrated.
- e. Equivalent access doors by Kees or Air Balance are acceptable.

7. WALL AND CEILING MOUNTED HEATERS

- a. Type, capacities and Characteristics: Refer to Drawings.

8. UNIT HEATERS

- a. Type, capacities and characteristics: Refer to Drawings.

2.02 FINISHES - NOT USED

2.03 ACCESSORIES - NOT USED

2.04 FABRICATION - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

A. REFER TO DIVISION 1 for General Requirements.

1. The Contractor, prior to installing any equipment, shall examine the conditions under which the equipment is to be installed, and shall notify the Architect/Engineer of conditions detrimental to the proper installation of the equipment.

3.02 DELIVERY, STORAGE, AND HANDLING - NOT USED

3.03 PREPARATION

A. CONDENSATE DRAIN TRAPS

1. Provide trapped condensate drains at all evaporators with depth as detailed and as recommended by equipment manufacturer. 1-¼ inch and larger traps shall be constructed of tees with plugs for cleanouts.

3.04 CONSTRUCTION

A. INSTALLATION

1. Install all equipment in accordance with the latest manufacturer's written instructions, including clearances, and in accordance with governing codes and recognized industry standards and practices to ensure that the equipment serves the intended function.
2. Coordinate all work with other trades as necessary for proper interfacing.
3. All equipment shall be protected from any form of damage. Any damaged equipment shall be replaced without additional cost to the Owner.

4. Make wall and roof penetrations weather tight at mechanical penetrations.
5. Furnish all motor controllers or contactors for proper operation of all motors, including specified requirements for interlocks and control sequences.
6. Curb Support: Install roof curb on roof structure, level and secure, according to NRCA's "Low-Slope Membrane Roofing Construction Details Manual," Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts." Install and secure rooftop air conditioners on curbs and coordinate roof penetrations and flashing with roof construction. Secure units to curb support with anchor bolts.

B. COORDINATION WITH OTHER WORK

1. All major equipment shall be started by a factory trained service mechanic, or a UA-MCA Certified Technician that is experienced in the service and operation of that piece of equipment. Major equipment includes roof-top units, computer room units, range hood make-up air units. The Mechanical Contractor shall start-up and place into operation all auxiliary equipment such as fans, etc.
2. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
3. Install piping adjacent to machine in such a way to allow service and maintenance.
4. Duct installation requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:
 - a. Install ducts to termination in roof curb.
 - b. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.
5. Electrical System Connections: Comply with applicable requirements in Division 26 Sections for power wiring, switches, and motor controls.

3.05 QUALITY FIELD CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Perform the following field quality-control tests and inspections and prepare test reports:
 1. After installing equipment and after electrical circuitry has been energized, test units for compliance with requirements.
 2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove malfunctioning units, replace with new units, and retest as specified above.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. Adjust initial temperature and humidity set points. (Refer to Sequence of Controls for initial set points.)
- B. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

PART 4 SCHEDULES - NOT USED

END OF SECTION

DIVISION – 26 ELECTRICAL

- 26 00 00 ELECTRICAL GENERAL PROVISIONS
- 26 05 00 BASIC MATERIALS AND METHODS
- 26 05 10 ELECTRICAL – FIRESTOPPING
- 26 05 19 CONDUCTORS AND CABLES
- 26 05 26 GROUNDING AND BONDING
- 26 05 32 PULL BOXES AND JUNCTION BOXES
- 26 05 33 OUTLET BOXES
- 26 05 38 RACEWAYS
- 26 05 42 DATA COMMUNICATIONS CONDUIT
- 26 05 53 ELECTRICAL IDENTIFICATION
- 26 05 73 OVERCURRENT PROTECTIVE DEVICES
- 26 24 00 PANELBOARDS
- 26 27 26 WIRING DEVICES
- 26 29 23 MOTOR STARTERS
- 26 50 00 LIGHTING

ELECTRICAL - GENERAL PROVISIONS 26 00 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Work covered by this specification shall include furnishing all labor, materials, equipment and services required to construct and install the complete electrical system shown on accompanying plans and specified herein.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.
- C. RELATED SECTIONS: The Contractor shall be familiar with any work specified elsewhere in these specifications. He shall perform this work as if specified herein.
 - 1. Section 01 33 23 - Shop Drawings, Product Data, and Samples.
 - 2. Section 01 25 00 - Substitutions & Product Options
 - a. Substitution of equipment shall be in accordance with Supplementary General Conditions of this Specification. Refer to Section 00 73 00.
 - b. Any proposed substitutions of equipment shall be accompanied by shop drawings showing revised equipment layouts and wiring diagrams. Where substituted equipment furnished requires use of larger, more, or differently arranged connections, such connections shall be installed to the complete satisfaction of Architect-Engineer without additional cost to Owner.
 - c. Should a substitution be accepted and subsequently proven unsatisfactory for the service intended within the warranty period, the contractor shall replace this material or equipment with that as originally specified, or corrected as directed by the Architect-Engineer.
 - d. Where substitutions alter the design or space requirements indicated on the drawings, the Contractor shall include all items of cost for the revised design and include cost of all allied trades involved.
 - e. Acceptance or rejection of the proposed substitutions shall be subject to the approval of the Architect-Engineer. If requested by the Architect-Engineer, the Division 26 Contractor shall submit for inspection samples of both the specified and proposed substitute items.
 - f. In all cases where substitutions are permitted, the Contractor shall bear any extra cost of evaluating the equality of the material and the equality of the equipment to be installed.

1.02 REFERENCES

- A. The following specifications and standards, of issues listed below, but referred to thereafter by basic designation only, form part of these specifications:
 - 1. National Electrical Code (NEC) NFPA-70.
 - 2. National Fire Protection Association's Recommended Practices.
 - 3. Local, City and State Codes and Ordinances.
 - 4. National Electrical Safety Code.
 - 5. Underwriters Laboratories, Inc. (UL).
 - 6. Underwriters Laboratories, Inc. (UL) UL 924.
 - 7. Illuminating Engineering Society (IES).
 - 8. Institute of Electrical and Electronic Engineers (IEEE).

9. Insulated Power Cable Engineers Association.
10. National Electrical Manufacturers Association (NEMA).
11. American National Standards Institute (ANSI).
12. American Society for Testing Materials (ASTM).
13. State Fire Prevention Code.
14. Occupational Health Safety Act (OSHA).
15. Service Requirements of serving utility company.
16. Life Safety Code - NFPA 101.
17. Americans with Disabilities Act (ADA)

The latest specifications and standards available shall be used for the above.

1.03 SUBMITTALS

A. PRODUCT DATA

1. It is the intent of these Specifications to establish quality standards of materials and equipment installed. Therefore, specific items are identified by manufacturer, trade name or catalog designation.
2. Submittals are required even when equipment being furnished is exactly as specified. Each sheet of submitted data shall be thoroughly edited to clearly indicate which features and/or options are being proposed.

B. SHOP DRAWINGS

1. The Contractor shall submit to the Architect-Engineer, detailed dimensioned shop drawings covering all items of electrical equipment. No equipment should be put into manufacture or ordered until these shop drawings or brochures have been reviewed by the Architect-Engineer
2. Submit manufacturer's catalog sheets and/or shop drawings covering all phases of work included in this contract, in accordance with Div 01 of this Specification.
3. Submittals shall be arranged in sets and bound. Material shall be organized into indexed sections corresponding to specification sections. No loose sheets will be acceptable. All data shall be submitted at one time. Partial submittals will not be accepted for review.
4. All submittals shall bear written certification to the effect that the Contractor has examined them and found them to be in accordance with Specifications and to be dimensionally correct with reference to available space and to related trades. Each submittal shall be signed and dated by the Division 26 Contractor.
5. In the event resubmittal is required, the Contractor shall revise the shop drawings/ submittals as required or as directed by the Architect-Engineer. The Contractor shall then resubmit the corrected shop drawings/submittals to the Architect-Engineer for final review.

C. SAMPLES: Refer to individual sections

D. Warranty: Refer to individual sections.

E. Refer to Section 01 77 00 for the General requirements for Contract Close-out.

1. "RECORD SET" drawings shall show actual installed locations of all electrical conduits, ducts, and cables outside and inside of the buildings, including the location of all underground junction boxes, pull boxes, or handholes. Make all necessary field measurements during the installation of the electrical work.

1.04 QUALITY ASSURANCE: Refer to individual sections

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - This work shall include: The general layout of the complete electrical system; arrangement of feeders, circuits, outlets, switches, controls, panelboards, service equipment, fixtures, and other work.
- B. DESIGN / PERFORMANCE REQUIREMENTS
 - 1. No rough-in or connection, etc., for HVAC Equipment shall be done until coordination is completed with Division 23 Contractor.
 - 2. Contractor shall give all necessary notices; obtain all permits, and pay all governmental taxes, fees and other costs in connection with his work; file all necessary plans; prepare all documents and obtain all necessary approvals of all governmental departments having jurisdiction; obtain required Certificates of Inspection for his work and deliver same to the Architect-Engineer before request for acceptance and final payment of work.
 - 3. Contractor shall include in the work, without extra cost to the Owner, all labor, materials, services, apparatus, drawings, etc. necessary to comply with all laws, ordinances, rules and regulations, whether or not shown on the drawings and/or included in the specifications.
 - 4. The drawings, which constitute an integral part of this contract, indicate the general layout of the complete electrical systems; arrangement of feeders, circuits, outlets, switches, controls, panelboards, service equipment, fixtures and other work.
 - 5. Field verification of scale dimensions on the drawings is directed since actual locations, distances, and levels will be governed by actual field conditions.
 - 6. The Contractor shall check Architectural, structural, plumbing, and heating and ventilating, and security electronics drawings to avert possible installation conflicts. Should drastic changes from original drawings be necessary to resolve such conflicts, the Contractor shall notify the Architect-Engineer and secure written approval and agreement on necessary adjustments before the installation is started.
 - 7. Prior to bidding, the drawings may be superseded by later revised or detailed drawings or specification addenda prepared by the Architect-Engineer, and the Contractor shall conform to all reasonable changes without extra cost to the Owner. All items not specifically mentioned in the specifications or noted on the drawings, but which are obviously or normally necessary to make a complete working installation, shall be included.
 - 8. Exterior utilities shall include all conduit and appurtenances outside of the building or as shown on the drawings. Unless otherwise noted, utilities shall include complete tie-in with utility lines at no extra cost to the Owner. The Contractor shall pay all costs required by utility company pertaining to construction and tie-in. Any deposits required for permanent service will be paid by the Owner.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

- A. Extra Materials: Refer to individual sections
- B. Maintenance Service: Refer to individual sections.
- C. The Owner shall retain the right to reject any materials and/or workmanship which are not in accordance with those specified, either before or after installation.

PART 2 PRODUCTS

- 2.01 MATERIALS / EQUIPMENT: All material and equipment shall be new and of the best quality normally used in good commercial practice, being products of reputable manufacture.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

- B. Review of Existing Conditions

1. Voltage that appears on the drawings and elsewhere in these Specifications has been obtained from the serving utility company. Before ordering equipment and starting the job, this Contractor shall verify the voltage with the utility company. If voltage differs from that noted on the drawings and in the specifications, the Architect-Engineer shall be notified at once. If the Architect-Engineer is not notified before equipment is ordered or construction is started, this contractor shall provide an acceptable and operable system at no additional cost to the Owner.

- C. Locations and elevations of various utilities, included within the scope of this work, have been obtained from existing plans and/or other substantially reliable sources, and are offered as a general guide only without guarantee as to accuracy. This Contractor shall examine the Site and verify to his own satisfaction the locations and elevations of all utilities and shall adequately inform himself of their relations to the work before entering into contract.

- 3.02 DELIVERY, STORAGE AND HANDLING: Refer to individual sections.

3.03 PREPARATION:

- A. JOB CONDITIONS : It shall be the responsibility of this contractor to plan, execute, and adjust his work as required to suit actual conditions encountered at the project site.

3.04 CONSTRUCTION

- A. CONSTRUCTION / INSTALLATION: Not applicable

- B. COORDINATION WITH OTHER WORK:

Close coordination with the Construction Manager and other trades is mandatory.

3.05 FIELD QUALITY CONTROL

- A. The contractor shall make themselves available to assist the Designer in additional testing and inspections as needed to ensure equipment/systems are complete and operable and operating correctly as needed.

PART 4 SCHEDULES – NOT USED

END OF SECTION

ELECTRICAL BASIC MATERIALS AND METHODS 26 05 00

PART 1 GENERAL

1.01 SUMMARY

A. GENERAL DESCRIPTION:

The Project Manual and project drawings are to be used together to describe the project. Any item contained in either shall be considered as being contained in both. In the event of discrepancies or conflicts, this contractor shall immediately notify the Architect-Engineer, in writing.

B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES: Refer to individual sections.

1.03 SUBMITTALS: Refer to Section 26 00 00.

A. PRODUCT DATA: Refer to individual sections.

B. SHOP DRAWINGS: Refer to individual sections.

C. SAMPLES: Refer to individual sections.

D. WARRANTY

The Contractor shall furnish a written certificate guaranteeing materials, equipment, and labor furnished to be free of defects for a period of 1 year, except where otherwise indicated, from and after the date of final acceptance of the work by the Owner, and further agrees that if defects appear within stipulated guaranty period same shall be replaced or made good without charge. (Exception: Lighting fixture lamps.)

E. CLOSE-OUT DOCUMENTS:

1. OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.
2. Include parts lists, wiring diagrams, and operating instructions for all operating equipment as well as approved submittals. Provide these documents on a CD/DVD or flash drive in indexed pdf form.
3. Brochures shall be tab indexed, indicating project name and include page showing date and local responsible vendors with addresses and telephone numbers for furnishing parts and equipment information. Provide these documents on a CD/DVD or flash drive in indexed pdf form.

F. DESIGN DATA/ REGULATORY REQUIREMENTS/ TEST REPORTS/ MANUFACTURER'S INSTRUCTIONS

1. Where installations are to be made "in accordance with manufacturer's recommendations", it shall be the responsibility of this Contractor to obtain, and maintain on file at the project site, a copy of said recommendations.
2. Provide typewritten reports to Owner's representative indicating time, personnel involved and other pertinent data for testing of fire alarm system, emergency power system and any other special systems.
3. Provide copies of all test or inspection reports by public agencies for electrical system.

1.04 QUALITY ASSURANCE: Refer to individual sections.

1.05 SYSTEM DESCRIPTION

A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this

section.

B. DESIGN / PERFORMANCE REQUIREMENTS

Provide tamperproof screws for any exposed screw on any device, which may become accessible to the inmates. Screws shall be identical to those furnished on the lighting fixtures.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Div 01 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS / EQUIPMENT

- A. Each item of equipment furnished under these Specifications is to be essentially the standard product of the manufacturer; however, component parts of equipment need not be products of one manufacturer.
- B. All material and equipment shall be new and of the best quality normally used in good commercial practice, being products of reputable manufacture. Each major component shall bear a nameplate stating name and address of the manufacturer and catalog number or designation. All materials shall be of the manufacturer's latest design standard, and bear Underwriters Laboratories, Inc. Label and the manufacturer's trademark.
- C. Where items of equipment and/or apparatus come under the following general headings, all of the equipment shall be from the same manufacturer:

Circuit breakers, panelboards and safety switches.

2.02 FINISHES: Manufacturer's standard unless otherwise indicated.

2.03 ACCESSORIES: Furnish and install all accessories required to complete the installation of the electrical equipment and system(s).

2.04 FABRICATION: Not applicable.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements
- B. REVIEW OF EXISTING CONDITIONS
 - 1. It shall be the responsibility of each bidder to visit the project site in order to be acquainted with existing conditions prior to submitting a bid.

3.02 DELIVERY, STORAGE AND HANDLING: Refer to individual sections.

3.03 PREPARATION

- A. JOB CONDITIONS
 - 1. Unless otherwise required or specified under another section of these Specifications, cutting and patching will be performed by this contractor.
- B. SURFACE PREPARATIONS: Refer to individual sections.
- C. PROTECTION
 - 1. The Electrical Contractor shall be responsible for the protection of electrical apparatus from damage and the elements. This shall include the erection of temporary shelters, cribbing, and the covering of apparatus in uncompleted areas of buildings with tarpaulins. Failure to comply with the foregoing by the contractor to the satisfaction of the Architect-Engineer will be sufficient cause for rejection of the piece of apparatus in

question.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. All electrical construction work shall be installed under the direction of a competent supervisor who shall be at the project site at all times when electrical installations are being made.
2. Installing Contractor will be held responsible for damage to other work resulting from negligence of his workmen. Such repairs shall be performed by the trade originally accomplishing the work but at the expense of this Contractor.
3. This Contractor shall utilize only competent and skillful workmen in handling and installing equipment specified.
4. Installation shall be carried out in such a manner that the many components will function as a complete workable system including any accessories required to accomplish such installation. Equipment shall be left properly adjusted and in satisfactory working order. Work is to be executed in conformity with best acceptable standard practices with the equipment being installed to allow for maximum accessibility and best appearance. Installation shall be such that future installations and expansion can be made with a minimum of expenditure.
5. Where possible, work must be scheduled for accomplishment during periods acceptable to the Owner, but when such scheduling is not feasible, work shall be executed at night or over weekends. No additional compensation will be allowed for overtime.
6. This Contractor shall furnish and locate sleeves and inserts required before floors and walls are built or he shall be responsible for the cost of cutting and patching required where such sleeves and inserts are not installed or where incorrectly located. This Contractor shall do all drilling required for installation of his hangers. All sleeves shall be metallic. PVC sleeves will not be accepted.
7. Any and all penetrations of fire and/or smoke rated walls, partitions, floors, and/or ceilings shall be accomplished in such a manner as to maintain the integrity of the fire rating and to meet U.L. requirements. Any and all such penetrations shall be done in a manner acceptable to the local fire officials. Refer to Division 26. Penetrations of four-hour rated walls, partitions, ceilings, and/or floors will not be permitted under any circumstances. Contractor shall carefully plan work in advance. Refer to architectural drawings for locations and ratings of various building elements.
8. No cutting shall be permitted to any of the structural members without the written permission of the Architect-Engineer.
9. Where openings are cut to permit installation of work, or cut to repair or remodel, any defects that may appear up to expiration of guarantee shall be corrected. Patching shall be done by the trade whose work is disturbed, but shall be paid for by the Contractor cutting openings or causing the damage.
10. In general, all floor-mounted equipment shall be installed on raised concrete bases. Concrete bases shall be not less than 4" high unless otherwise noted, and shall be poured in forms built of new dressed lumber. Foundation corners shall be neatly chamfered by means of sheet metal or triangular wood strips nailed to the form. Foundation bolts shall be placed in forms when concrete is poured; bolts shall be correctly located by means of templates. Allow 1" below equipment bases for alignment and grouting. After grouting, the forms shall be removed and the surface of the foundations shall be hand rubbed with carborundum.
11. This Contractor shall keep his work area clean at all times. All scraps and debris shall be removed from work area. If this Contractor does not maintain his area, the Construction Manager shall clean this area and back-charge this Contractor.

12. Provide all trenching and backfill as required for the placement of work required under this Division. All trenching shall be performed per the utility trenching and backfill requirements in Division 2.
13. Furnish and install cord and plug for all appliances as required. This includes electric water heaters, disposals, electric drinking fountains, and other similar items.
14. It shall be the responsibility of this contractor to ensure that all work remains accessible (as required by code) after completion of construction. Provide additional access panels where required. Access panels shall be identical to those provided by other trades.
15. Conductors and raceways installed in air handling plenums or other air handling spaces shall comply with the requirements of NEC 300.22 .

B. COORDINATION WITH OTHER WORK

1. (CM) This contractor shall be responsible to furnish and install all foundations and supports required for electrical equipment. Coordinate all work with the Construction Manager.
2. Where work of this Contractor will be installed close to work of other trades, or where there is evidence that work of this Contractor will interfere with work of other trades, this Contractor shall assist in working out space conditions to make satisfactory adjustment. If a Contractor installs his work before coordinating with other trades, he shall make necessary changes in his work to correct the condition without extra charge.
3. The Division 26 Contractor shall give full cooperation to other trades, furnishing, in writing, to the Architect-Engineer, any information necessary to permit work of all trades to be installed satisfactorily and with the least possible interference or delay.
4. Chases, recesses, and other openings required for the location of conduits or equipment in new construction shall be provided by other trades. Contractor shall advise the Construction Manager of the size and locations, and furnish all necessary drawings required for his work in sufficient time to allow for provision of chase.

C. SPECIAL TECHNIQUES

1. Apparatus which is too large to permit access through stairways, doorways, or shafts, shall be brought to the job site by the contractor involved and put in place before the closing of the structure.

3.05 FIELD QUALITY CONTROL

A. SITE TESTS, INSPECTION

1. After installation is complete, and at such time as the Architect-Engineer may direct, this Contractor shall conduct an operating test for approval. Equipment shall be demonstrated to operate in accordance with the requirements of this Specification. Test shall be performed in the presence of the Architect-Engineer or authorized representative. This Contractor shall furnish instruments and personnel required for the test and Owner will furnish necessary electrical power.
- B. Test each circuit with a "megger" tester to verify that all insulation values conform to NEC requirements. Check each motor controller to ensure that properly sized overload devices are installed. Test, check, and adjust all other systems as required to ensure proper operation. Provide instruction to Owner's personnel as to proper operation and maintenance of each system.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. Provide a prime coat of paint for all supports, hangers, frames and other materials not having a factory-applied finish. Paint and application methods shall be as described in Division 9.

- B. Where factory-applied finishes become scratched or chipped, repair surfaces utilizing "touch up" materials obtained from the manufacturer.
- C. When construction is complete, all equipment installed under this contract shall be thoroughly cleaned, interiors as well as exteriors. Remove all construction dust and debris and touch up factory finishes where required.

PART 4 SCHEDULES – NOT USED

END OF SECTION

ELECTRICAL FIRESTOPPING 26 05 10
THROUGH-PENETRATION FIRESTOPPING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. GENERAL DESCRIPTION:

Only tested firestop systems shall be used in specific locations as follows:
Penetrations for the passage of cables, conduit, and other electrical equipment through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.

B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

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

A. Test Requirements: ASTM E-814, "Standard Method of Fire Tests of Through Penetration Fire Stops".

B. Underwriters Laboratories (UL)

1. UL Fire Resistance Directory:

- a. Firestop Devices (XHJI)
- b. Fire Resistance Ratings (BXUV)
- c. Through-Penetration Firestop Systems (XHEZ)
- d. Fill, Voids, or Cavity Material (XHHW)
- e. Forming Materials (XHKU)

C. Underwriters Laboratories (UL) UL 2079 "Tests for Fire Resistance of Building Joint Systems".

D. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments.

E. Inspection Requirements: ASTM E 2174 – 01, "Standard Practice for On-site Inspection of Installed Fire Stops."

F. ASTM E-84, Standard Test Method for Surface Burning Characteristics of Building Materials.

G. All major building codes: ICBO, SBCCI, BOCA, and IBC.

H. NFPA 101 - Life Safety Code

1.03 SUBMITTALS

A. PRODUCT DATA

Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions to comply with Specifications.

B. SHOP DRAWINGS

Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineering judgment must include both project name and contractor's name who will install firestop system as described in drawing.

C. Submit material safety data sheets provided with product delivered to job-site.

D. SAMPLES: Not applicable.

- E. WARRANTY: Minimum of one year on products and installation.
 - F. DESIGN DATA/ REGULATORY REQUIREMENTS/ TEST REPORTS/ MANUFACTURER'S INSTRUCTIONS
 - 1. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory.
 - 2. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration materials.
- 1.04 QUALITY ASSURANCE
- A. QUALIFICATIONS
 - 1. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.
 - 2. A manufacturer's direct representative (not distributor or agent) shall be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This shall be done per manufacturer's written recommendations published in their literature and drawing details.
 - B. CERTIFICATIONS
Firestop System installation must meet requirements of ASTM E-814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
- 1.05 SYSTEM DESCRIPTION
- A. EXTENT OF WORK - As identified in the drawings, schedules, and other sections as it relates to this section.
 - B. DESIGN / PERFORMANCE REQUIREMENTS
 - 1. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.
 - 2. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.
 - 3. For those firestop applications that exist for which no UL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment drawings must follow requirements set forth by the International Firestop Council.
- 1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

- B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- C. Use only firestop products that have been UL 1479, ASTM E-814 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- D. Cast-in place firestop devices are installed prior to concrete placement for use with non-combustible and combustible plastic pipe (closed and open piping systems), or electrical cable bundles, penetrating concrete floors, the following products are acceptable:
 - 1. Hilti CP 680 Cast-In Place Firestop Device
- E. Sealants, foams or caulking materials for use with non-combustible items including rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
 - 1. Hilti FS-ONE Intumescent Firestop Sealant
 - 2. Hilti CP 620 Fire Foam
- F. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:
 - 1. Hilti FS-ONE Intumescent Firestop Sealant
- G. Foams, intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:
 - 1. Hilti FS-ONE Intumescent Firestop Sealant
 - 2. Hilti CP 618 Firestop Putty Stick
- H. Non curing, re-penetrable intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:
 - 1. Hilti CP 618 Firestop Putty Stick
- I. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:
 - 1. Hilti CP 617 Firestop Putty Pad
- J. Materials used for complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
 - 1. Hilti FS 637 Trowelable Firestop Compound
 - 2. Hilti FS 657 FIRE BLOCK
 - 3. Hilti CP 620 Fire Foam
- K. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
 - 1. Hilti FS 657 FIRE BLOCK
- L. Provide a firestop system with an "F" Rating as determined by UL 1479 or ASTM E814, which is equal to the time rating of construction being penetrated.
- M. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent: Subject to compliance with through penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below: No substitutions will be accepted without prior approval of the Architect.
 - 1. Hilti, Inc., Tulsa, Oklahoma 800-879-8000
 - 2. 3M www.3m.com/us/arch_construct/firestop

3. Nelson Fire Stop Products www.nelsonfirestop.com

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING

A. PACKING, SHIPPING, HANDLING, AND UNLOADING

Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.

B. STORAGE AND PROTECTION

Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature limitations.

C. ACCEPTANCE AT SITE

Receive materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.

3.03 PREPARATION

A. JOB CONDITIONS

1. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
2. Verify penetrations are properly sized and in suitable condition for application of materials.
3. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
4. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
5. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
6. Do not proceed until unsatisfactory conditions have been corrected.
7. Do not use materials that contain flammable solvents.
8. Scheduling
 - a. Schedule installation of CAST IN PLACE firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.
 - b. Schedule installation of other firestopping materials after completion of penetrating item installation but prior to covering or concealing of openings.

B. SURFACE PREPARATIONS

Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

C. PROTECTION

1. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.
2. Protect materials from damage on surfaces subjected to traffic.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
2. Do not use damaged or expired materials.
3. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
4. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.

B. COORDINATION WITH OTHER WORK

1. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections.
2. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.

3.05 FIELD QUALITY CONTROL

A. SITE TESTS, INSPECTION

1. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
2. Keep areas of work accessible until inspection by applicable code authorities.
3. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard.
4. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

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

PART 4 SCHEDULES – NOT USED

END OF SECTION

ELECTRICAL CONDUCTORS AND CABLES 26 05 19

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: This section includes building wire and cables.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES:

- A. ASTM American Society for Testing and Materials
- B. NEC. National Electrical Code (NFPA 70)
- C. NEMA National Electrical Manufacturers Association
- D. NFPA National Fire Protection Association
- E. UL Underwriters Laboratories

1.03 SUBMITTALS

- A. PRODUCT DATA
Submit manufacturer's data sheets for each type of product.
- B. SHOP DRAWINGS: Not applicable.
- C. REGULATORY REQUIREMENTS:
All products shall be listed and classified by UL.

1.04 QUALITY ASSURANCE: Not Applicable.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All wire and cable for feeder circuits shall conform to the latest requirements of the current edition of the NEC and shall meet all ASTM Specifications. Wire and cable shall be of new manufacture, 98% conductivity; shall have size, grade of insulation, voltage and manufacturer's name permanently marked on outer covering at regular intervals.
- B. Conductors shall be soft- drawn copper with insulation and outer covering as noted. Conductor sizes shall be Standard American Wire Gage sizes.
- C. Insulation on low voltage conductors shall be Type THW or THWN. All 600-volt conductors in conduits or other raceways where encased in concrete on grade, where installed below grade, or where exposed to moisture, shall have moisture- resistant type insulation. Lighting and receptacle branch circuit conductors shall be Type THHN/THWN. All conductors shall conform to UL Standard 83. (See Division 26 for Fixture Wiring.)
- D. Minimum conductor size shall be No. 12 AWG unless otherwise indicated. Conductors No. 8 and larger shall be stranded as follows:
 - 7 strands up through #2.
 - 19 strands for #1 through #4/0
 - 37 strands for 250 kcmil through 500 kcmil
 - 61 strands for 600 kcmil through 1000 kcmil

- E. Wire and cable shall be factory color-coded by integral pigmentation, with a separate color for each conductor and neutral conductor.
- F. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - 1. Southwire Company www.southwire.com
 - 2. General Cable www.generalcable.com
 - 3. American Insulated Wire Corp. www.aiwc.com
 - 4. Essex Group, Inc. Ft. Wayne, Indiana

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING

- A. **PACKING, SHIPPING, HANDLING, AND UNLOADING**
Per manufacturer's instructions. Conductors shall be delivered in complete coils or reels with identifying size and insulation tags.
- B. **STORAGE AND PROTECTION**
Wire and cable shall be suitably protected from weather and damage during storage and handling and shall be in first- class condition when installed.

3.03 PREPARATION

- A. **JOB CONDITIONS**
No conductors or cables shall be installed in conduits, ducts, or raceways until the raceway system has been completed. Swab interior of each raceway prior to pulling wire.
- B. **SURFACE PREPARATIONS**
Where conductors are to be connected to metallic surfaces, the coated surfaces of the metal shall be polished before installing the connector. Lacquer coating of conduits shall be removed where ground clamps are to be installed.

3.04 CONSTRUCTION

- A. **CONSTRUCTION / INSTALLATION**
 - 1. Conductors terminating at vibrating or moving equipment shall be stranded, regardless of size.
 - 2. Where taps and splices are necessary and approved, they shall be made in approved splice boxes, wireways, manholes, etc. with suitable connectors as recommended by wire and cable manufacturer.
 - 3. The color code indicated in Table 1 shall be used consistently throughout the Electrical System installation, unless specified to the contrary in another section of these Specifications for that system. Color coding for #8 and larger conductors may be by means of colored tape, applied in overlapping layers to each conductor at each outlet, cabinet, junction, or termination. Tape shall cover at least 6 inches of the conductor and shall not loosen or change color with age.
 - 4. All conductors shall be installed in conduit unless otherwise noted. When installing conductors, the Electrical Contractor shall exercise due care to prevent damage to conductor or insulation. All conductors in a given raceway shall be installed simultaneously. Only approved cable lubricants shall be used. All feeder cables shall be continuous from origin to panel or equipment termination without running splices in intermediate pull or splice boxes. Unless otherwise noted, each conduit raceway shall contain only those conductors constituting a single feeder circuit or branch circuits as

shown on the drawings. Do not combine "home-runs". Conductor de-rating shall be calculated in accordance with the National Electrical Code.

5. Feed cable straight into the conduit by hand, or for large conductors, over a large diameter sheave, avoiding short bends, sharp devices, and "cross-overs." Remove all lashings used for temporary bunching of individual wires before they enter the conduit. Lead-out wires at all pull boxes and conduits, feeding them in again for the next run. Cable shall not be pulled around short right-angle bends. See National Electrical Code.
6. Minimum conductor size for power and lighting circuits shall be #12 awg. For circuits longer than 75 feet, conductor size shall be increased one size for each additional 75 feet or fraction thereof.
7. Parallel feeders shall be installed in separate raceways. Take care to ensure all conductors are of identical length.
8. The Electrical Contractor shall furnish and install all hangers, racks, cable cleats and supports required to make a neat and substantial cable installation.

B. COORDINATION WITH OTHER WORK: As required.

3.05 FIELD QUALITY CONTROL

- A. Do not exceed manufacturer's recommendations for pulling tensions and bending radii.
- B. Check all wires and cables for physical damage and proper connection.
- C. Check for continuity and correctness of wiring and identification.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK: As required.

PART 4 SCHEDULES

TABLE 1

Color code for lighting and power conductors shall be as follows:

PHASES	120/208	277/480	120/240	120/240
	Volts	Volts	Volts	Volts
	<u>3-Phase</u>	<u>3-Phase</u>	<u>3-Phase</u>	<u>1-Phase</u>
PHASE A	BLACK	BROWN	BLACK	BLACK
PHASE B	RED	ORANGE	ORANGE	RED
PHASE C	BLUE	YELLOW	BLUE	
NEUTRAL	WHITE	GRAY	WHITE	WHITE
GROUND	GREEN	GREEN	GREEN	GREEN
ISOLATED GROUND	GREEN W/ORANGE STRIPE	GREEN W/ORANGE STRIPE	GREEN W/ORANGE STRIPE	GREEN W/ORANGE STRIPE

END OF SECTION

ELECTRICAL GROUNDING AND BONDING 26 05 26

PART 1 GENERAL

1.01 SUMMARY

A. GENERAL DESCRIPTION:

The entire Electrical System and Building Structure shall be grounded. The following items of equipment, appurtenances, and as required by Article 250 of the NEC, shall be grounded:

1. Electric Service, Equipment and Enclosures.
2. Conduits and Raceways.
3. Neutral and Ground Conductors.
4. Switches, Breakers, Panels.
5. Motor Frames, Controller Cabinets, Lighting Fixtures, and building structure.

- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. NEC: National Electrical Code
- B. UL: Standards 467 and 869.
- C. IEEE: Standards 142 and 241.

1.03 SUBMITTALS:

A. PRODUCT DATA:

Provide manufacturer's data sheets for each type of product, including, but limited to, ground rods and connectors.

1.04 QUALITY ASSURANCE: Not applicable

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All products shall comply with NEC, UL and IEEE as applicable.
- B. All grounding conductors shall be copper.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING: Not applicable.

3.03 PREPARATION

- A. JOB CONDITIONS: Adjust work as required to suit actual conditions encountered at the project site.

B. SURFACE PREPARATIONS

Thoroughly clean all surfaces prior to bonding.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. Bonding jumpers to maintain ground continuity at raceway and pull box expansion joints shall be stranded cable or copper braid sized in accordance with Article 250 of the NEC and installed with approved ground fittings.
2. Grounding jumpers shall be installed across all water meters. Jumpers shall be stranded bare copper cable or copper bus attached by means of exothermic welds to the water pipe.
3. Grounding shall be accomplished by means of a metallic water system, where possible, or grounding assemblies. Where not possible, the following method shall be used:
 - a. Ground rods shall be installed with the top of the rods at least 6" below finished grade. Grounding conductors shall be so installed as to permit shortest and most direct path from equipment to ground. All connections to ground conductors shall be accessible for inspection and made with exothermic welds, or approved bolted connectors where permitted. All contact surfaces shall be thoroughly cleaned before connections are made to insure good metal-to-metal contact.
 - b. Single-Rod assemblies shall consist of 1 copper-clad steel ground rod 3/4" diameter, length as required by ground test section with minimum length of 8'-0". All connections to the rod shall be made with exothermic welds.
4. Grounding Connectors: Cadweld exothermic at all rods and terminations below grade; bolted pressure connectors shall be used above grade.
5. Where the underground portion of a metallic water pipe system being used for the grounding electrode is less than 30'-0", additional electrodes shall be used as outlined in Article 250 of the NEC.
6. System grounding conductors shall be sized in accordance with NEC Table 250-94. Equipment grounding conductors shall be sized in accordance with NEC Table 250-95.
7. Provide separate green ground conductor in each receptacle circuit. Attach to receptacle by means of "pigtail" tap so that removal of any device will not affect grounding of other devices.
8. Provide #6 AWG (minimum) bare copper grounding conductor from telephone equipment location and connect to service ground. Run underground, in conduit.
9. Provide separate green grounding conductor in each panelboard feeder.
10. Provide separate internal green grounding conductor in each flexible conduit used for motor connection.
11. Where isolated grounds are required, they shall be in accordance with the requirements of the NEC.

B. COORDINATION WITH OTHER WORK: As required.

3.05 FIELD QUALITY CONTROL

A. SITE TESTS, INSPECTION

1. After grounding system has been completely installed, and before any equipment is placed in operation, the Electrical Contractor shall perform a test of the network in the presence of an authorized representative of the Architect-Engineer. This test shall be performed by use of a ground resistance tester. The resistance between ground and

absolute earth shall be in compliance with the requirements of the NEC. Provide additional ground rods, as necessary until the resistance requirements are achieved.

2. All connections and terminations below grade shall be left exposed until such time as they have been inspected and approved by the local inspection agency.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK: As required in accordance with accepted industry standards.

PART 4 SCHEDULES – NOT USED

END OF SECTION

ELECTRICAL PULL BOXES & JUNCTION BOXES 26 05 33

PART 1 GENERAL

1.01 SUMMARY

A. GENERAL DESCRIPTION:

Furnish and install pull boxes and junction boxes where necessary in the raceway system to facilitate conductor installation.

- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. ANSI American National Standards Institute
- B. NEC National Electrical Code (NFPA-70)
- C. NEMA National Electrical Manufacturers Association
- D. NFPA National Fire Protection Association
- E. UL Underwriters Laboratories

1.03 SUBMITTALS

A. PRODUCT DATA

Submit manufacturer's catalog data sheets for each type of product.

1.04 QUALITY ASSURANCE:

Comply with the requirements of the NEC and all other applicable codes and standards. All products shall be UL listed.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section. In general, conduit runs of more than 100'-0", or with more than 3 right-angle bends, shall have a pull box installed at a convenient intermediate location. All such pull boxes shall be indicated on the Contractor's "RECORD SET" Drawings.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

All boxes shall be made of galvanized steel, or as specified, of metal gage and physical size as required by the NEC for the number and size of conduits and conductors involved. Boxes shall have removable screw covers for flush or surface installation as indicated on the plans.

A. Pull Boxes and Junction Boxes

- 1. Boxes for indoor use shall be galvanized steel and shall comply with NEC, UL 50, and ANSI/NEMA OS 1. They shall be minimum 14-gauge steel and have a screw-on or hinged cover. Hinged cover is required for any box having any dimension exceeding 12 inches.
- 2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Crouse-Hinds www.crouse-hinds.com
 - b. Thomas & Betts www.tnb.com
 - c. Raco www.hubbell-raco.com

B. Cast Metal Boxes

1. Boxes for outdoor use or in wet locations shall be of the cast metal type, conforming to NEMA 250, type 4 and type 6. They shall be UL listed as raintight. Boxes shall have ground flange, neoprene gasket, and covers secured by stainless steel screws. Boxes shall be traffic rated where required.
2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Crouse-Hinds www.crouse-hinds.com
 - b. Thomas & Betts www.tnb.com
 - c. Appleton Electric www.appletonelec.com

2.02 FINISHES: Provide manufacturers standard finish unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING

Materials shall be suitably packaged to prevent damage during shipment. Damaged goods shall not be accepted at the project site. Materials stored at the project site shall be kept in a clean, dry area.

3.03 PREPARATION: Not applicable.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. Where indicated on the plans and where necessary to terminate, tap-off or redirect multiple conduit runs, the Electrical Contractor shall furnish and install appropriately designed junction boxes.
2. Boxes shall be securely mounted to the building structure with supporting facilities independent of the conduits entering or leaving the boxes.
3. Exposed or surface mounted boxes in finished areas, (offices, etc.) shall be of the cast type with threaded hubs. Boxes in un-finished areas (mechanical rooms, etc.) may be sheet metal type.
4. Provide an appropriate cover on each and every junction box and pull box and provide appropriate plugs in all un-used openings.
5. Provide tamperproof screws for any exposed screw on any device which may become accessible to the inmates. Screws shall be identical to those furnished on the lighting fixtures.
6. All boxes shall remain "accessible" at all times per NEC.

B. COORDINATION WITH OTHER WORK

Locate pull and junction boxes so as to avoid interference with the work of other trades.

3.05 FIELD QUALITY CONTROL

- A. Verify that all boxes are securely anchored in place.
- B. Verify that all boxes have proper covers installed and that all holes are plugged.

PART 4 SCHEDULES – NOT USED

END OF SECTION

ELECTRICAL OUTLET BOXES 26 05 33

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Provide outlets boxes as required for all devices.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. NEC National Electrical Code (NFPA-70)
- B. NEMA National Electrical Manufacturers Association
 - 1. OS 1-2003
- C. UL Underwriters Laboratories

1.03 SUBMITTALS

- A. PRODUCT DATA

1.04 QUALITY ASSURANCE

All materials shall conform to all applicable industry standards.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

All outlet boxes shall be standard hot-dipped galvanized steel type, at least 1-1/2" deep, single or gang style type of size (per NEC) to accommodate devices and conductors indicated. Shallower boxes may be used where required by structural conditions and are specifically approved by the Architect-Engineer. Boxes shall conform to UL 514.

Switch and receptacle boxes shall be approximately 2" x 3".

Outlet boxes for special equipment such as electrical thermostat controls and signal circuits, telephone, clocks, etc. shall be suitable for the equipment and service intended, but shall be not less than 4" square and 2" deep.

- A. Ceiling and Bracket Outlet boxes
 - 1. Ceiling and bracket outlet boxes shall not be less than 4" octagonal except that smaller boxes may be used where required by the particular fixture to be installed.
 - 2. All ceiling and bracket outlets shall be equipped with a 3/8" fixture stud, installed through the back of the box and not dependent on its mounting bolts for its support. The fixture stud shall be securely fastened to the box to prevent turning.
- B. Sheet Metal Boxes, standard
 - 1. Concealed or flush mounted outlet boxes shall be zinc-coated or cadmium plated sheet steel suitable for the conditions of each outlet.

2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Raco (Hubbell-Raco) www.hubbell-raco.com
 - b. Steel City (Thomas & Betts) www.tnb.com
- C. Sheet Metal Boxes, deep (concrete boxes)
 1. Boxes shall be suitable and constructed for installation in concrete.
 2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Raco (Hubbell-Raco) www.hubbell-raco.com
 - b. Steel City (Thomas & Betts) www.tnb.com
- D. Cast Metal Boxes
 1. Boxes shall be cast-metal type having threaded hubs and gasketed covers.
 2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Appleton www.appletonelec.com
 - b. Steel City (Thomas & Betts) www.tnb.com

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING

- A. Store all products in a clean, dry area until used.

3.03 PREPARATION: Not applicable.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. Switch boxes shall be 1, 2, 3, etc. gangs as required. Sectional switch boxes shall not be used. Suitable covers designed for the equipment served shall be provided.
2. Boxes shall be rigidly supported from a structural member of the building, either directly or by using a metal or wood brace per Article 370 of the NEC.
3. Outlet boxes shall be equipped with plaster ring or cover as necessary.
4. Outlet boxes for GFCI receptacles shall be 4" square with single gang plaster ring and coverplate.
5. For flush mounting in masonry walls, outlet boxes shall be square cut masonry type.
6. Cast-metal type boxes shall be installed in the following locations/conditions:
 - imbedded in concrete
 - damp locations
 - Exposed or surface mounted boxes in finished areas, (offices, etc.)
7. Where exposed to the weather, boxes shall be of the threaded hub, cast malleable iron type with gasketed cast covers.
8. Boxes installed in concealed locations shall be set flush with the finish surfaces and shall be provided with the proper type extension rings or plaster covers where required. Outlets in plaster walls shall be equipped with plaster rings except as otherwise noted or specified. Boxes shall be installed in a rigid and satisfactory manner and shall be fastened directly with wood screws on wood; bolts and expansion shields on concrete or brick; toggle bolts on hollow masonry units; and, machine screws or welded threaded

studs on steel work.

9. Device plates as specified, or noted elsewhere, shall be provided for each outlet to suit the device installed. Plates shall be installed with all 4 edges in continuous contact with finished wall surfaces without the use of mats or similar devices. Plates shall be installed vertically with an alignment tolerance of 1/16". The use of sectional device plates will not be permitted.
10. Provide coverplate on each and every outlet box in every system. If no device is installed, provide blank coverplate.
11. Wall switch outlets shall be 48" above finished floor unless otherwise indicated. When located near doors, they shall be installed on the lock side of the door; unless otherwise noted.
12. Telephone and convenience receptacle wall outlet boxes shall be set flush 18" above finished floor unless otherwise noted.
13. Outlet boxes shall be installed at the approximate locations shown on the drawings, or within 2'-0" of the location as directed by the Architect-Engineer.
14. Mounting heights indicated on the drawings are the centerline height of the outlet or device above the finished floor. Where outlets are indicated to be installed above counter tops, coordinate with millwork drawings to ensure that there will be no conflicts with coverplates and back splashes.
15. Outlets for electric drinking fountains shall be installed so that outlet and cord will be concealed by the cabinet. Coordinate exact location and mounting height with the Plumbing contractor.
16. Box heights may be adjusted, if required, to coordinate with exposed block or brick coursing.
17. Outlet boxes for devices located on opposite sides of one-hour and two-hour walls shall be separated by a minimum horizontal distance of 24 inches.
18. No outlet box of any kind for any purpose will be permitted to be flush mounted in four-hour walls. If outlet boxes are indicated on four-hour walls, contact Architect/Engineer for alternate location.
19. Provide tamperproof screws for any exposed screw on any device which may become accessible to the inmates. Screws shall be identical to those furnished on the lighting fixtures.
20. Where outlet boxes are flush-mounted in rated walls, clearance between wallboard facing and box shall not exceed 1/8", per U.L. requirements.

B. COORDINATION WITH OTHER WORK

1. The Electrical Contractor shall study all plans relative to the spaces surrounding each outlet in order that his work may fit the work of others; and, that when fixture outlets or controls are installed, they will be symmetrically located and best-suited for each condition.

3.05 FIELD QUALITY CONTROL: As required.

- A. Floor boxes: Prior to concrete pour, verify boxes are securely supported, all unused openings are plugged with proper fittings and all joints are sealed with compound to prevent entrance of concrete or moisture. Boxes shall be adjusted to insure box covers will be flush with finished floor surface.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK: As required.

- A. Floor boxes: As soon as traffic is permitted on slab, remove any accumulation of water and foreign matter to avoid corrosion and insure covers are flush with finished floor. After final

floor covering is installed, install cover plates and accessories.

PART 4 SCHEDULES – NOT USED

END OF SECTION

ELECTRICAL RACEWAYS 26 05 38

PART 1 GENERAL

1.01 SUMMARY

A. GENERAL DESCRIPTION:

Provide raceway systems for all conductors for all systems installed on this project unless otherwise indicated. Provide empty raceway system(s) for wiring to be installed by Owner.

B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES:

A. ANSI American National Standards Institute

1. C80.1 Rigid Steel Conduit, Zinc Coated.
2. C80.3 Electrical Metallic Tubing, Zinc Coated.

B. NEC National Electrical Code (NFPA-70)

C. NEMA National Electrical Manufacturers Association

1. NEMA FB 1 Fittings, Cast Metal Boxes, and Conduit Bodies
2. NEMA TC 3 PVC Fittings for use with Rigid PVC Conduit and Tubing

D. UL Underwriters Laboratories

1. UL 1 Flexible Metal Conduit
2. UL 6 Rigid Steel Conduit
3. UL 360 Liquid tight Flexible Steel Conduit
4. UL 514B Conduit, Tubing, and Cable Fittings
5. UL 651 Schedule 40 and 80 Rigid PVC Conduit
6. UL 797 Electrical Metallic Tubing

1.03 SUBMITTALS

A. PRODUCT DATA:

1. Provide manufacturer's data sheets for each type of product.

1.04 QUALITY ASSURANCE: Not Applicable

1.05 SYSTEM DESCRIPTION

A. EXTENT OF WORK:

1. As identified in the drawings and schedules as it relates to this section.
2. Empty conduit systems for:
 - a. Data Communications

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

All conduits shall be of standard sizes and each length shall bear Underwriters Laboratories Label and manufacturer's trademark.

A. Rigid Steel Conduit (GRS)

1. Rigid steel conduit shall be heavy wall galvanized mild steel, specially selected with reference to uniformity of thickness and freedom from defects.
 2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Republic Conduit, Youngstown, OH 1-800-445-7473
 - b. Allied Tube and Conduit, Harvey, IL 1-800-882-5543
 - c. Wheatland Tube Company, Collingswood, NJ, 1-800-257-8182
- B. Electrical Metallic Tubing (EMT)
1. Electrical metallic tubing raceways shall be steel, continuous seamless tubing, galvanized or sheradized on the exterior, coated on the interior with a smooth hard finish of lacquer, varnish, or enamel. EMT shall be in conformance with ANSI C80.3 and UL 797 listed.
 2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Republic Conduit, Youngstown, OH 1-800-445-7473
 - b. Allied Tube and Conduit, Harvey, IL www.atcelectrical.com
 - c. Wheatland Tube Company, Collingswood, NJ, 1-800-257-8182
- C. Rigid Polyvinyl Chloride Conduit (PVC)
1. Conduit shall be Type 40, heavy wall or Type 80 extra heavy wall conforming to NEMA TC 2 and UL 651 listed.
 2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Carlon Products, Cleveland, OH, www.carlon.com
 - b. J-M Manufacturing Co., Livingston, NJ, www.jmpipe.com
 - c. National Pipe & Plastics, www.nationalpipe.com
- D. Flexible steel conduit
1. Shall be UL 1 listed, hot-dipped galvanized or electrogalvanized steel, inside and outside. Flexible steel conduit shall be single strip, continuous, flexible interlocked, double-wrapped steel, galvanized inside and outside, forming a smooth internal wiring channel.
 2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Universal Metal Hose, Chicago, IL, 1-773-277-0700
 - b. AFC Cable Systems www.afcweb.com
- E. Liquidtight Flexible steel conduit
1. Shall be UL 360 listed, hot-dipped galvanized or electrogalvanized, inside and outside. Flexible steel conduit shall be single strip, continuous, flexible interlocked, double-wrapped steel, galvanized inside and outside, forming a smooth internal wiring channel. Outer jacket shall be tough, nonmetallic, sunlight-resistant, liquid-tight and shall be gray in color.
 2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Flexotek, Inc. www.flexotek.com
 - b. Alflex www.alflex.com
 - c. AFC Cable Systems www.afcweb.com
 - d. Electri-Flex www.electriflex.com

2.02 FINISHES: As specified.

2.03 ACCESSORIES

All fittings and conduit bodies shall conform to NEMA FB 1.

A. Rigid Steel Fittings and Conduit Bodies

1. Fittings and conduit bodies shall be threaded type of material to match conduit.
2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Appleton Electric www.appletonelec.com
 - b. Cooper Crouse-Hinds www.crouse-hinds.com
 - c. Hubbell-Killark www.hubbell-killark.com

B. EMT Fittings and Conduit Bodies

1. Fittings shall be steel, compression type, raintight, U.L. Listed for ½" through 2" conduit; setscrew or compression type for 2-1/2" and larger conduit. Couplings and connectors shall be made up tight and snug. INDENTER TYPE FITTINGS SHALL NOT BE USED. All fittings shall be zinc or cadmium plated. Diecast fittings are not acceptable.

C. Liquidtight Conduit Assemblies

1. Fittings shall be UL 514B listed.
2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Thomas & Betts www.tnb.com
 - b. Hubbell-Killark www.hubbell-killark.com

D. PVC Fittings and Conduit Bodies

1. Shall conform to NEMA TC 3.
2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Carlon Products, Cleveland, OH, www.carlon.com
 - b. National Pipe & Plastics, www.nationalpipe.com
 - c. J-M Manufacturing Co., Livingston, NJ, www.jmpipe.com

E. Bushings

1. Bushings shall be non-metallic insulating type.
2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. O-Z/Gedney www.o-zgedney.com
 - b. Thomas & Betts www.tnb.com
 - c. Appleton Electric www.appletonelec.com

2.04 FABRICATION: Not applicable.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING

- A. PACKING, SHIPPING, HANDLING, AND UNLOADING

1. Deliver to project site in standard 10 foot lengths.

B. STORAGE AND PROTECTION

1. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering. Protect PVC conduit from exposure to sunlight.

C. ACCEPTANCE AT SITE

1. Inspect for physical damage.

3.03 PREPARATION: Not applicable.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. Minimum size conduit shall be ½". (Conduits down to wall mounted switches may be ½".) No more than 4 No. 12 conductors shall be pulled in ½" conduit. For conductors larger than No. 12, ¾" conduit shall be the minimum size. Other sizes shall be as indicated on the plans, or as required by the NEC for number and size of conductors installed.
2. Flexible steel conduit shall be used to connect all motors and other moving electrical equipment. Liquid-tight flexible steel conduit, type U.A. shall be used in damp locations where flexible conduit is required, and for connection to any type of pump. Flexible conduit shall be used for connection on all motor terminal boxes to conduit stubs or outlets. Where motors are mounted on sliding bases, the flexible connection shall be of sufficient (minimum 12") length to allow full travel of motor on base. Flexible conduit only shall be used for connection of control equipment requiring piping, such as solenoid valves, pressure controls, etc. Where lighting fixtures require flexible conduit connections to junction boxes, maximum length shall be 6 feet and shall include a separate grounding conductor.
3. Conduit run in finished areas of building shall be concealed in floor, wall, ceiling, above or behind furring, or as noted on the drawings. Contractor shall avail himself of Architectural and Structural drawings for information relating to slab thickness, reinforcing, finish lines, chases, furrings, ceiling construction and finishes, and shall be guided accordingly in installation of his work. In unfinished areas, conduit is to be run concealed where construction permits; otherwise, it may be run exposed. Exercise particular care in routing and grouping exposed conduit to present neat and workmanlike appearance with all lines running parallel with or perpendicular to building lines, giving due attention to ducts, pipe and other interferences. Exercise extreme care in laying out electrical work to insure that ceiling outlets are located symmetrically within areas and with respect to air conditioning, heating and ventilating outlets, tile patterns, finishes, etc. Any errors shall be corrected at no additional cost to the Owner.
4. Where embedded conduits cross building expansion joints, the Contractor shall furnish and install an offset expansion joint or a sliding expansion joint. Sliding expansion joints shall be provided with bonding strap and clamp. Where conduits are exposed, provide expansion fittings or flexible conduit as required.
5. Where conduits are run individually, they shall be supported by straps or by using 1/4" galvanized rods or No. 8 galvanized wire with clips equal to Caddy "Kon Clips". The hangers shall be secured by means of toggle bolts on hollow masonry; expansion shields and machine screws or standard preset inserts on concrete or solid masonry; machine screws or bolts on metal surfaces; and wood screws on wood construction. The use of perforated strap or steel tie-wire will not be permitted. One-hole strap may be utilized on conduits sized 1-inch and smaller. Two-hole straps shall be used on larger conduits. In detention facilities, all conduits which may become accessible to the inmates shall be secured by two-hole straps, regardless of conduit size.

6. Where multiple conduits are run horizontally at the same elevation and grade, they may be supported on trapezes or channels suspended on rods. Trapeze members, including suspension rods, shall be properly sized for number, size and loaded weight of conduits to be supported.
7. Conduits entering panelboards, pull boxes, support boxes or outlet boxes shall be secured in place by galvanized steel lock nuts and bushing.
8. Conduit joints shall be made tight with approved couplings; turns and offsets made with long sweep ells or bends. Ends of conduit are to be cut square, reamed and brought butt-to-butt in couplings. Field-cut threads in rigid steel conduits shall be coated.
9. Bends in conduit shall be made with an approved bending device and conduit bends or off-sets in which conduit is crushed, deformed or otherwise injured shall not be installed. Field bends and offsets shall be uniform and symmetrical. Install factory elbows on 2" and above conduit.
10. Conduit which is not embedded in concrete, all vertical risers, etc. shall be firmly secured by means of approved pipe clamps, hangers, etc. Run conduit without sags and pockets and in general drain or pitch toward boxes. Where conduit crosses building expansion joints, provide expansion fittings and approved ground jumper.
11. Where conduits are supported under exposed steel beams or bar joists, approved type beam clamps and/or clamp/hangers shall be used.
12. Conduit system(s) shall be electrically and mechanically continuous. Conduit system shall be bonded throughout.
13. All hangers shall be so located as to properly grade and support horizontal conduits without appreciable sagging of these lines. (See Articles 346 and 348, NEC). All conduits shall be of standard size and each length shall bear Underwriters Laboratories Label and manufacturer's trademark.
14. Rigid PVC may be used in lieu of metallic conduit for the following applications:
 - a. Outdoors and underground for:
 - 1). Electrical Primary Service
 - 2). Electrical Secondary Service
 - 3). Telephone Service Entrance
 - 4). Electrical Branch Circuits
 - b. Under Slab on Grade: PVC conduits may be run under, but not embedded in, slab on grade. Each conduit shall transition to rigid steel ells before turning vertically up through grade slab. Exposed PVC conduit emerging from floors will not be permitted.
 - c. In outdoor installations, PVC conduits shall not be installed under parking lots, driveways or other paved areas except pedestrian sidewalks no more than five feet in width, unless encased in concrete. Encasement must be approved in advance by Architect-Engineer.
 - d. All joints shall be made watertight using fittings and other materials as recommended by the conduit manufacturer.
 - e. PVC conduit is not permitted to be exposed above the ground floor slab under any conditions. Rigid PVC may be used in cast-in-place concrete walls and where completely embedded in floor slabs above grade.
 - f. Flexible nonmetallic conduit is not acceptable on this project.
15. Conduits entering or leaving the building or passing through areas of substantially different temperatures shall be sealed to prevent the passage of moisture in

accordance with the requirements of NEC 300.7 A . Provide sealing type fittings approved for this purpose.

16. Conduits to roof mounted equipment shall be installed inside the equipment curbs where possible to avoid additional penetrations in the roof. Coordinate with Division 23 contractor.
17. Where empty conduit systems are indicated, provide all raceways, junction boxes, outlet boxes, and appurtenant devices as indicated or as required for a complete system.
18. In each "empty" conduit, provide a 9-gauge galvanized pull wire. Leave 12 inches slack wire at each end.
19. Identify raceways above furred ceilings and in unfinished spaces every 20 feet.
20. Conduits below grade shall be installed a minimum of 24 inches below finished grade.
21. Galvanized rigid conduit shall be used for all feeders. Galvanized rigid conduit shall also be used in damp locations, buried in earth and in concrete. In damp locations, joint compound shall be applied to the threads to make watertight. Electric metallic tubing may be used for branch circuits where galvanized rigid conduit is not required. (Contractor may elect to use PVC only in the applications and conditions listed above.)
22. In all other applications not mentioned above, wiring methods shall be in accordance with the requirements of the NEC.

B. COORDINATION WITH OTHER WORK

1. Lay out and install conduit runs to avoid proximity to hot water piping. In no case run conduit within 3" of any piping.
2. Where lines of different Contractors are racked on same supporting structures, each Contractor shall cooperate with the other trades involved to properly locate supporting members, and shall furnish a proportionate share of labor and materials involved in same installation; also shall cooperate with other trades so that the same type hanger is used throughout.
3. Verify conduit routing and termination locations, sleeve sizes, and locations prior to rough-in to avoid conflicts with the work of other trades.

3.05 FIELD QUALITY CONTROL

A. SITE TESTS, INSPECTION

1. Verify all field measurements.
2. Verify all joints and connections are properly tightened.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. Field-cut threads shall be protected with zinc-rich paint prior to installation.
- B. Conduit shall be kept corked and dry during construction and shall be swabbed out before wires are pulled into conduit.

PART 4 SCHEDULES – NOT USED

END OF SECTION

ELECTRICAL DATA COMMUNICATIONS CONDUIT SYSTEM 26 05 40

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Empty conduit system for the Owners data communications system
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES: Not applicable

1.03 SUBMITTALS: Not required.

1.04 QUALITY ASSURANCE: Refer to related sections.

1.05 SYSTEM DESCRIPTION

A. EXTENT OF WORK

- 1. As identified in the drawings and schedules as it relates to this section.
- 2. Furnish and install an EMPTY CONDUIT SYSTEM for the data communications system, as described in these specifications and indicated on the drawings.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Conduit, boxes, etc. shall be as described in other sections of these specifications.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING: Refer to related sections.

3.03 PREPARATION: Not applicable

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

- 1. Minimum size raceway for data communications outlets shall be 1" conduit. Provide 1 conduit run to accessible ceiling space from each outlet unless otherwise noted. Provide and leave in place a suitable nylon pull cord to facilitate the installation of the data communications cables by others. Provide factory bends for data communications conduit runs. Do not install more than two 90° bends without installing a pull box. For conduit runs longer than 100'-0", install a pull box.
- 2. Furnish and install outlet boxes where shown on the drawings. Where these outlets are combined with other outlets, proper barriers must be provided.
- 3. Install a data communications type cover plate as required by the Owner on all outlet boxes that are intended for data communications use. Where outlets are un-used, provide blank cover plate.
- 4. Provide service entrance conduit(s) as shown on the drawings or as otherwise required by the owner. Coordinate all conduit sizes, locations, routing, points of termination,

burial depths, and any other requirements with the owner prior to commencing any installation.

5. Any screws which may become accessible to the inmates shall be of the tamper-resistant type, identical to those provided for the lighting fixtures.

PART 4 SCHEDULES – NOT USED

END OF SECTION

ELECTRICAL IDENTIFICATION 26 05 53

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Provide identification for all components of all systems installed under Division 26.
 - 1. Nameplates shall adequately describe the function or use of the particular equipment involved. Where nameplates are detailed on the drawings, inscription and size of letters shall be as shown. Nameplates for panelboards shall include the panel designation, voltage and phase of the supply.
 - 2. For example, "Panel A, 120/208 v, 3-phase, 4 wire Fed from Panel MDP". The name of the machine on the motor nameplates for a particular machine shall be the same as the one used on all motor starters, disconnects and pushbutton station nameplates for that machine.
 - 3. Emergency power system identification shall be in accordance with the requirements of the NEC.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES:

- A. NEC National Electrical Code

1.03 SUBMITTALS:

- A. PRODUCT DATA:
Provide manufacturer's data sheets for each type of product including, but not limited to, nameplates, materials, colors.

1.04 QUALITY ASSURANCE: Not applicable.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.
- B. The following items shall be equipped with nameplates:
 - 1. All motor starters, pushbutton stations, control panels, time switches.
 - 2. Disconnect switches, fused and unfused, panelboards, circuit breakers, contactors or relays in separate enclosures.
 - 3. Special electrical systems shall be properly identified at junction and pull boxes, terminal cabinets and equipment racks.
 - 4. Emergency power system components, enclosures, boxes and panelboards.
 - 5. Service disconnects.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

A. NAMEPLATES

1. Nameplates shall be laminated Phenolic plastic, BLACK front-and-back with WHITE core, with lettering etched through the outer covering. At all locations, lettering shall be 1/4" high, unless otherwise indicated on the drawings.
2. Nameplates for equipment (panelboards, starters, disconnects, etc.) connected to or part of the emergency power system shall be as above, except shall be RED in color.
3. Nameplates for isolated ground system equipment identification shall be as above, except shall be ORANGE in color. (eg, panelboard SE1)

B. Tape labels will not be accepted.

C. Refer to remaining sections for additional requirements regarding equipment/device colors.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING

3.03 PREPARATION

A. JOB CONDITIONS

B. SURFACE PREPARATIONS

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. Nameplates shall be securely fastened to the equipment with No. 4 Phillips', round head, cadmium plated, steel self-tapping screws. Adhesives will not be accepted.

PART 4 SCHEDULES – NOT USED

END OF SECTION

ELECTRICAL OVERCURRENT PROTECTIVE DEVICES 26 05 73

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: This specification covers molded case circuit breakers rated 15 through 1,000 amperes, 120 V AC, 240 V AC, 277 V AC, and 480 V AC.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. NEC National Electrical Code
- B. UL Underwriters Laboratories

1.03 SUBMITTALS

A. PRODUCT DATA

- 1. Submit manufacturer's catalog data sheets

1.04 QUALITY ASSURANCE: Not applicable.

1.05 SYSTEM DESCRIPTION

A. EXTENT OF WORK

- 1. As identified in the drawings and schedules as it relates to this section.
- 2. Breakers covered under this Specification may be installed in switchboards, panelboards, motor control centers, combination motor starters, and individual enclosures. Circuit breakers shall be as indicated on the drawings and shall have trip ratings as shown.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

A. EXTRA MATERIALS

- 1. 20% spare fuses or a minimum of 3 of each size and type shall be placed in a spare fuse cabinet wall mounted where shown on the Drawings or as directed by the Architect. Fuse cabinet shall be made of 12 gage metal with shelf and hinged door with key-operated lock.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. MOLDED CASE CIRCUIT BREAKERS

- 1. Molded case circuit breakers shall be quick-make and quick-break thermal-magnetic type. They shall have wiping type contacts. Each shall be provided with arc chutes, individual trip mechanisms on each pole. 2- and 3-pole breakers shall be integral common trip. All breakers shall be calibrated for operation in an ambient temperature of 40°C.
- 2. All circuit breakers shall be standard or full size and shall be of the bolt-on type. Miniature breakers and plug-in breakers will not be accepted.
- 3. Molded case circuit breakers shall be trip-free. Each breaker shall have trip indication independent of the "ON" or "OFF" positions.
- 4. Breakers shall be capable of being mounted in enclosures without the use of base

insulators between the breaker and the enclosure.

5. Branch circuit breakers feeding convenience outlets shall have sensitive instantaneous trip settings of not more than 10 times the trip rating of the breaker in order to give "flash protection" for frayed stranded wire cords. Circuit breakers serving HVAC equipment shall be HACR type, where applicable. Breakers used or intended for switching duty shall carry "SWD" label.
6. All molded case circuit breakers shall be UL listed and meet NEMA Standards Publication No. ABI-1964. All devices shall meet Federal Specification No. W-C-375A.
7. MANUFACTURERS:
Circuit breaker manufacturer shall be same as panelboard manufacturer.

B. FUSES

1. All fuses shall be of the same manufacture to retain selectivity as designed.
2. All fuses shall be current limiting with 200,000 amperes interrupting capacity.
3. Class RK-1 Fuses shall be BUSSMANN KTNR (KTSR) Limitron fast-acting fuse.
4. Class RK-5 Fuses shall be BUSSMANN LPNR (LPSR) Low-Peak Dual-Element Fuse or FRN (FRS) Fusetron Dual-Element Fuse.
5. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Bussmann www.bussmann.com
 - b. Ferraz Shawmut www.ferrazshawmut.com
 - c. Littelfuse www.littelfuse.com

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING: Not applicable.

3.03 PREPARATION: Not applicable.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. Fuses shall not be shipped installed in switches in electrical equipment, nor shall they be shipped to the job site, until the equipment is ready to be energized.
2. Standard dimension fuses 600 amps or less (Class RK-1) shall be installed in any switches serving circuit breaker panels unless otherwise noted.
3. Standard dimension fuses 600 amps or less (Class RK-5) shall be installed in all other switches and shall be dual-element, time delay type with a spring actuated thermal overload element that operates at 280°F temperature.
4. Motor protection dual-element fuses installed in individual circuits shall be sized at 125% of motor nameplate current rating or the next standard fuse size. (or as recommended by equipment manufacturer).
5. A fuse identification label, showing type and size, shall be placed inside the door of each switch.

PART 4 SCHEDULES – NOT USED

END OF SECTION

ELECTRICAL PANELBOARDS 26 24 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Electrical Panelboards
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. NEC National Electrical Code

1.03 SUBMITTALS

A. PRODUCT DATA

- 1. Provide manufacturer's catalog data sheets for all products. **A letter from the utility company stating the maximum available fault current(s) shall be included with the submittal data.**

B. SHOP DRAWINGS

- 1. Layout and ratings for each panelboard

1.04 QUALITY ASSURANCE: Not applicable.

1.05 SYSTEM DESCRIPTION

A. EXTENT OF WORK:

- 1. As identified in the drawings and schedules as it relates to this section.
- 2. **Available fault currents shall be obtained from the serving utility company.**

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS / EQUIPMENT

A. PANELBOARDS

- 1. Panelboards shall be of the dead-front safety type equipped with circuit breakers and shall be of the type shown on the drawings. Panelboards shall be equipped with the type, size and number of branch circuit breakers arranged and numbered as shown on the drawings. Where main circuit breaker is shown, it shall be of the type and size indicated. Panelboards shall be enclosed in code-gage steel cabinet complete with door, door cylinder lock, circuit identification, directory holder, neutral bar, ground bus and lugs for all cable connections. All locks shall be keyed alike. Where "SPACE" is indicated, mounting hardware shall be provided and space shall be bussed for future breakers. Panel fronts shall be provided with removable 1-pole fillers in spaces. Branch connectors, mounting brackets and other hardware shall be provided for future breakers as indicated on the drawings. Circuit-breaker units shall be mounted on channel iron or formed-steel mounting backs, drilled and tapped so that units of same frame size and number of poles may be interchanged and removed from the front without disturbing the adjacent units. Panels shall be bussed according to the requirements shown on the drawings, and shall have lugs equipped with approved connectors for the size of conductor feeding the panel. Double lugs shall be provided for handling double feeder conductors. All lugs shall be solderless type. All panelboards shall be suitably rated for the available fault currents on this project. Panelboards shall be listed for use as service

entrance equipment, where required. All bus bars, including ground bar, shall be tinned copper, 98% conductivity.

2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Square "D" www.squared.com
 - b. Siemens www.sea.siemens.com
 - c. General Electric www.ge.com

B. CIRCUIT BREAKERS

1. Provide HACR breakers where indicated or where required by the NEC or the manufacturer of the equipment served.
2. All circuit breakers shall be standard or full size and shall be of the bolt-on type. Miniature breakers and plug-in breakers will not be accepted.
3. Refer to Section 16475 for additional requirements.

2.02 FINISHES: Industry standard gray unless otherwise indicated.

2.03 ACCESSORIES

A. NAMEPLATES

1. All panelboards shall have name plates as described in Division 26.

2.04 FABRICATION: Factory assembled.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING

- A. Store in a clean, dry area until used.

3.03 PREPARATION: Not applicable.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. Each circuit breaker shall be permanently numbered. Feeder and branch circuit disconnecting means shall be identified in accordance with the requirements of the NEC.
2. Each panel shall have a typewritten directory mounted under a transparent protective cover, set in a metal frame on the inside of the cabinet door. The panelboard directory shall contain the following information:
 - a. Panel designation and voltage.
 - b. Distribution panel from which it is fed.
 - c. For each circuit breaker, complete information concerning the outlet controlled, including the room number or area designated on the plans.
3. Panelboards shall be installed with top device 5'-6" above finished floor unless otherwise indicated.
4. Where ceiling space exists, recessed panelboards shall have spare conduits stubbed above ceiling. Install one 3/4" conduit for each 2 spare breakers and/or blank spaces.
5. Panelboard nameplates shall be mounted on exterior trim so as to remain visible with

panelboard door closed.

PART 4 SCHEDULES – NOT USED

END OF SECTION

ELECTRICAL EQUIPMENT DISCONNECTS 26 26 16

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Provide disconnecting means for all equipment.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. NEC National Electrical Code
- B. UL Underwriters Laboratories

1.03 SUBMITTALS

- A. PRODUCT DATA - Submit manufacturer's catalog data sheets for each type of product.
- B. SHOP DRAWINGS: Not required.

1.04 QUALITY ASSURANCE: Not applicable

1.05 SYSTEM DESCRIPTION

A. EXTENT OF WORK

- 1. As identified in the drawings and schedules as it relates to this section.
- 2. Furnish and install disconnecting means for each item of equipment as required by the National Electrical Code (NEC) except where provided as an integral part of the equipment.
- 3. Furnish and install fusing as required by equipment manufacturer. (See above.)

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS / EQUIPMENT

A. DISCONNECT SWITCHES

- 1. Disconnect switches shall be fusible or non-fusible as indicated on the plans. Switches shall be fusible whenever required by manufacturer of equipment served.
- 2. All disconnect switches shall be heavy-duty type, quick-make, quick-break or as shown on the plans. Disconnect switches for motor circuits shall be horsepower-rated.
- 3. Disconnect switches shall have a cover interlock, with defeat device, to prevent unauthorized personnel from opening the door when the switch is on.
- 4. All disconnect switches shall have switch blades which are fully visible in the "OFF" position when the door is open. Disconnect switches shall be of dead-front construction with permanently attached arc suppressors hinged or otherwise attached to permit easy access to line-side lugs without removal of the arc suppressor. Lugs shall be UL listed for copper and/or aluminum cables and front removable. All current-carrying parts shall be plated by electrolytic processes.
- 5. Enclosures shall be of code gage (UL 98) sheet steel or code gage (UL 98) galvanized steel. Disconnect switches shall be horsepower-rated for 250 Volts AC or DC, or 600 Volts AC as required.
- 6. Fusible disconnect switches shall be equipped with a device to reject all non-class "R"

fuses. Switches shall withstand up to 200,000 amps RMS symmetrical.

7. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Square-D www.squared.com
 - b. General Electric www.ge.com
 - c. Cutler-Hammer www.cutler-hammer.eaton.com

2.02 FINISHES

Enclosures shall be treated with a rust-inhibiting phosphate and finished in Gray baked enamel.

2.03 ACCESSORIES: Not applicable.

2.04 FABRICATION: Not applicable.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING - store all materials in a clean, dry area until ready for use.

3.03 PREPARATION: Not applicable

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. Motor rated switches or snap switches may be used where indicated on the drawings unless required otherwise by code or equipment operation.
2. Disconnect switches shall be furnished in NEMA 1 general purpose enclosures except NEMA 3 or 3R (Raintight) shall be used in damp locations.
3. All disconnect switches shall be identified with engraved laminated plastic labels as described in Division 26. Each disconnecting means shall be identified in accordance with the requirements of the NEC and the International Fire Code 605.3.1.
4. Any screws which may become accessible to the inmates shall be of the tamper-resistant type, identical to those provided for the lighting fixtures.
5. Where disconnects are required to be mounted on the equipment served, such as roof mounted equipment, exercise care to ensure that equipment access for repair, maintenance, etc. is not compromised.

PART 4 SCHEDULES – NOT USED

END OF SECTION

ELECTRICAL WIRING DEVICES 26 27 26

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION:
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. NEC National Electrical Code
- B. UL Underwriters Laboratories

1.03 SUBMITTALS

- A. PRODUCT DATA
Submit manufacturer's data sheets

1.04 QUALITY ASSURANCE: Not applicable

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

All devices shall be specification grade and shall be white in color (unless otherwise indicated). All switches and receptacles on emergency power circuits shall be red in color. All receptacles on isolated ground systems shall be orange in color.

A. Switches

1. All switches shall be quiet type, rated 20 ampere, 120-277 v AC. Lock-type switches shall be of comparable grade, complete with 1 key for each switch.
2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:

TYPE	HUBBELL NO.
SPST (Single Pole)	1221
DPST (Double Pole)	1222
SPDT (Three-Way)	1223
DPDT (Four-Way)	1224
SPST w/Pilot Light	1221-PL
SPST Key-Operated	1221-L

- a. Hubbell Inc., Orange, CT., 1-203-799-4100
- b. Cooper Industries, Long Island City, NY, 1-800-441-3177
- c. Leviton Mfg. Co., Little Neck, NY, 1-877-892-2666

B. Receptacles

1. Unless otherwise specified or indicated, all standard duplex receptacles shall be 20 ampere, 120-volt.
2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:

TYPE	HUBBELL NO.	
Single, 20 Amp	5361	
Duplex, 20 Amp	5362	
Duplex GFCI, 20 Amp	GF5362	
Duplex, Isolated ground	IG8300	
a. Hubbell Inc.	Orange, CT.	1-203-799-4100
b. Cooper Industries	Long Island City, NY,	1-800-441-3177
c. Pass & Seymour/Legrand	Syracuse, NY	1-800-223-4185

C. Device Plates

1. Device plates for flush mounted devices shall be:
 - a. Smooth shatterproof or unbreakable plastic (except as otherwise indicated). Material shall be thermoset or polycarbonate. Urea or phenolic will not be accepted.
 - b. Heavy-duty nylon, minimum.070"
 - c. Stainless steel / magnetic Type 430, single gang or multi-gang as required to fit the boxes and devices at each location.
 - d. Color of plate shall match color of device except where stainless steel plates are used.
2. MANUFACTURERS: Device plates shall be of same manufacture as the devices with which they are associated except stainless steel locking cover shall be equal to Pass & Seymour #WP26-L.

D. Weatherproof Enclosures

1. Receptacle covers shall be clearly marked "Suitable for Wet Locations While in Use" and shall be in compliance with NEC 410-57(b) for wet locations. Gaskets shall be provided between the enclosure and the mounting surface, and between the cover and base to assure a proper seal. The enclosure shall be constructed of impact resistant polycarbonate and provided with stainless steel mounting hardware. Enclosures shall be specification grade.
2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:

TayMac Corporation, Gilbert, AZ, 1-800-526-5416
Carlson, Cleveland, OH, 1-216-464-3400
Cantex, Mineral Wells, TX, 1-800-433-5623

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING: Not applicable

3.03 PREPARATION: Not applicable

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

Mounting heights of all devices shall be in accordance with ADA requirements.

1. Switches and Receptacles

- a. Switches shall be loaded to not more than 80% of their rating. Where shown near doors, wall switches shall be mounted not less than 2" and not more than 12" from

trim. Switches shall be installed near "strike" side of door.

- b. All receptacles shall be installed with ground pole at top. Receptacles installed outdoors or in other "wet" locations shall be GFCI type in 4" square flush mounted box wherever possible. Outdoor locations shall be provided with a weatherproof cover. Outlets which must be surface mounted outdoors shall be mounted in cast boxes.
 - c. All switches and receptacles on emergency power circuits shall be red in color. Cover plates shall have panel and circuit number engraved on plate (except stainless steel plates which shall have the information labeled on the back side of the plate.)
 - d. All switches and receptacles on isolated ground systems shall be orange in color. Cover plates shall have panel and circuit number engraved on plate (except stainless steel plates which shall have the information labeled on the back side of the plate.)
 - e. All cover plates in kitchen areas shall be stainless steel.
 - f. Cover plates in detention (inmate) areas shall be heavy-duty nylon material with tamper-proof screws.
 - g. Cover plates in other areas not accessible to the inmates shall be shatterproof plastic except where stainless steel plates are required.
2. Device Plates
 - a. Device plates shall be installed plumb, with all edges in continuous contact with the wall surface.
 3. Outlets which must be surface mounted indoors shall be installed in cast boxes with cover plates appropriate for the box and the device.

PART 4 SCHEDULES – NOT USED

END OF SECTION

ELECTRICAL MOTOR STARTERS 26 29 23

PART 1 GENERAL

1.01 SUMMARY

A. GENERAL DESCRIPTION:

B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES: Not applicable.

1.03 SUBMITTALS

A. PRODUCT DATA

Submit manufacturer's catalog data sheets.

1.04 QUALITY ASSURANCE: Not applicable.

1.05 SYSTEM DESCRIPTION

A. EXTENT OF WORK:

1. As identified in the drawings and schedules as it relates to this section.
2. Except where noted on the Drawings to be furnished by the electrical Contractor, all magnetic starters and control equipment for motors shall be furnished under Division 23.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS / EQUIPMENT

A. MANUAL MOTOR STARTERS

1. Manual starters shall be provided for single phase, fractional horsepower motors 1/2 horsepower and smaller or as noted on the drawings. Manual starters shall be single- or 2-pole and with selector switches, push buttons, pilot lights, and locking attachment as required, and enclosed in NEMA enclosure.
2. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - a. Allen-Bradley www.ab.com
 - b. Square-D www.squared.com
 - c. Hubbell www.hubbell.com

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING: Not applicable.

3.03 PREPARATION: Not applicable.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

Check each starter to determine that properly sized overload devices have been installed.

B. COORDINATION WITH OTHER WORK

1. This Contractor shall coordinate with the Mechanical Contractor as to the sizing of motor controllers and thermal overloads for equipment and apparatus supplied by that Contractor.
2. This Contractor shall cooperate in all matters pertaining to the Mechanical Controls with the Controls Contractor who will be responsible for the overall operation and supervision of the system.
3. Where starters are required to be mounted on the equipment served, such as roof mounted equipment, exercise care to ensure that equipment access for repair, maintenance, etc. is not compromised.

PART 4 SCHEDULES – NOT USED

END OF SECTION

ELECTRICAL LIGHTING 26 50 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: LED lighting fixtures. Pre-approval is not required for this section.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. ETL - Electrical Testing Laboratories, Inc.

1.03 SUBMITTALS

A. PRODUCT DATA

Provide manufacturers product data sheet for each item. Each sheet shall be properly edited for this project to clearly indicate standard features, options, etc. Data shall include dimensions, weights and performance information.

1. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
2. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing and Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps and accessories identical to those indicated for the lighting fixture as applied in this Project, IES LM-79, and IES LM-80.
 - a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
 - b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

- B. SHOP DRAWINGS - Not required.

- C. SAMPLES: Not required unless requested.

D. WARRANTY

1. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
2. Warranty Period: Five years from date of Substantial Completion.
3. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - a. Lamps: Two of each type, color temperature, and rating installed.
 - b. Diffusers and Lenses: Two of each type and rating installed.
 - c. Globes and Guards: Two of each type and rating installed.

1.04 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
- B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient

Lighting Products, and complying with the applicable IES testing standards.

- C. Provide luminaires from a single manufacturer for each luminaire type.
- D. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

1.05 SYSTEM DESCRIPTION

A. EXTENT OF WORK:

- 1. As identified in the drawings and schedules as it relates to this section.
- 2. The Electrical Contractor shall furnish all luminaires, lighting equipment and components shown on the plans, listed in the Fixture Schedule and specified herein. He shall furnish all labor and materials to install specified equipment in the manner indicated.
- 3. The Electrical Contractor shall furnish and install accessory wiring as specified herein.
- 4. Take special note of the voltage at which fixtures are to be operated.
- 5. It shall be the responsibility of the Contractor to assure his count by type as well as voltage prior to ordering. Extras will not be allowed for any errors by this Contractor.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Div 01 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.
- C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
- D. Recessed Fixtures: Comply with NEMA LE 4.
- E. Bulb shape complying with ANSI C79.1.
- F. Lamp base complying with ANSI C81.61 or IEC 60061-1.
- G. CRI of minimum 80 CCT of 4000 degrees K.
- H. Rated lamp life of 50,000 hours.
- I. Lamps dimmable from 100 percent to 0 percent of maximum light output.
- J. Internal driver.
- K. Nominal Operating Voltage: as noted on plans.
 - 1. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.

2.02 MATERIALS

- A. Metal Parts:
 - 1. Free of burrs and sharp corners and edges.
 - 2. Sheet metal components shall be steel unless otherwise indicated.
 - 3. Form and support to prevent warping and sagging.
- B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under

operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

C. Diffusers and Globes:

1. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
2. Glass: Annealed crystal glass unless otherwise indicated.
3. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.

D. Housings:

1. Extruded aluminum housing and heat sink.

E. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp characteristics:
 - a. "USE ONLY" and include specific lamp type.
 - b. Lamp diameter, shape, size, wattage, and coating.
 - c. CCT and CRI for all luminaires.

2.03 METAL FINISHES

- A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.04 LUMINAIRE FIXTURE SUPPORT COMPONENTS

- A. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.
- B. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage.
- C. Rod Hangers: 3/16 minimum diameter, cadmium-plated, threaded steel rod.

2.05 EXIT SIGNS

- A. Internally Lighted Signs:
1. Operating at nominal voltage as noted in Lighting Fixture Schedule.
 2. Lamps for AC Operation: LEDs; 50,000 hours minimum rated lamp life.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING

- A. PACKING, SHIPPING, HANDLING, AND UNLOADING
All luminaires and lighting equipment shall be delivered to the project site complete with suspension accessories, canopies, hickies, casings, sockets, holders, reflectors, ballasts, diffusing material, louvers, plaster frames, recessing boxes, etc., all wired and assembled as indicated.

3.03 PREPARATION: Not applicable.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. Comply with NECA1.
2. Fixtures installed in T-bar type ceilings shall be installed as required by NEC 410-16(c).
3. All fixtures shall be square and level in relation to surrounding materials and space.
4. All ceiling mounted fixtures shall be supported independently of the ceiling membrane except where otherwise required by the NEC. Refer to Division 26. Also refer to details on architectural plans regarding fixtures mounted on security ceilings.
5. All fixtures intended for floodlighting or spotlighting shall be aimed at night for optimum illumination of the area or object intended.

B. COORDINATION WITH OTHER WORK

1. This contractor shall coordinate with the ceiling contractor before ordering fixtures to ensure that the fixtures ordered have the proper mounting features to be compatible with the ceiling types.

3.05 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

C. Prepare test and inspection reports.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. All fixtures shall be protected from general construction and shall be thoroughly cleaned prior to final inspection.

END OF SECTION

DIVISION - 31 EARTHWORK

31 11 00 SITE PREPARATION

31 23 00 EARTHWORK, EXCAVATION, BACKFILLING AND COMPACTING

31 25 00 SLOPE PROTECTION AND EROSION CONTROL

31 31 16 TERMITE TREATMENT

SITE PREPARATION 31 11 00

PART 1 GENERAL

1.01 SUMMARY

A. GENERAL DESCRIPTION:

1. Cleaning site of debris, grass, trees and other plant life in preparation for site or building excavation work.
2. Protection of existing structures, trees or vegetation indicated on the contract documents to remain.
3. Stripping topsoil from areas that are to be incorporated into the limits of the project and where so indicated on the construction drawings.

B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

C. REFERENCES – NOT USED

1.02 SUBMITTALS – NOT USED

1.03 QUALITY ASSURANCE – NOT USED

1.04 SYSTEM DESCRIPTION

A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

B. DESIGN / PERFORMANCE REQUIREMENTS

1. Environmental Requirements
 - a. Construct Temporary Erosion Control Systems as shown on the Plans or as directed by the Engineer to protect adjacent properties and water resources from erosion and sedimentation.

1.05 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING – NOT USED

3.03 PREPARATION

A. JOB CONDITIONS & PROTECTION

1. Locate and identify existing utilities that are to remain and protect them from damage.
2. Protect trees, plant growth and features designated to remain as final landscape.

3. Conduct operations with minimum interference to public or private accesses and facilities. Maintain access and egress at all times and clean or sweep any roadways daily or as required by the governing authority. At such times as deemed necessary by the owner, dust control shall be provided with sprinkling systems or equipment provided by the contractor.
4. Protect bench marks, property corners and all other survey monuments from damage or displacement. If a marker needs to be removed it shall be referenced by a licensed land surveyor and replaced, as necessary, by the same.
5. Provide traffic control for any work in or adjacent to public roadways, sidewalks or other public rights-of-way in accordance with the U.S. Department of Transportation "Manual of Uniform Traffic Control Devices" and the state highway department requirements.
6. Verify that existing plant life and clearing limits are clearly tagged, identified and marked in such a manner as to insure their safety throughout construction operations.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. Clearing
 - a. Clear areas required for access to site and execution of work.
 - b. Unless otherwise indicated on the drawings, remove trees, shrubs, grass, other vegetation, improvements, or obstructions interfering with installation of new construction. Removal includes digging out stumps and roots. Depressions caused by clearing and grubbing operations are to be filled to subgrade elevation to avoid water ponding. Satisfactory fill material shall be placed in horizontal layers and thoroughly compacted per fill requirements of this section and Section 31 23 00.
 - c. Remove grass, trees, plant life, stumps and all other construction debris from the site to a dump site that is suitable for handling such material according to state laws and regulations.
2. Topsoil Excavation
 - a. Strip topsoil from areas that are to be filled, excavated, landscaped or re-graded to such a depth that it prevents intermingling with underlying subsoil or questionable material.
 - b. Cut heavy growths of grass from areas before stripping and remove with the rest of the cleared vegetative material.
 - c. Topsoil shall consist of organic surficial soil found in depth of not less than 6". Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones and other objects over 2" in diameter, weeds, roots, and other objectionable material.
 - d. Stockpile topsoil in storage piles in areas shown or where directed. Construct storage piles to freely drain surface water. Cover storage piles as required to prevent windblown dust. Dispose of unsuitable topsoil as specified for waste material, unless otherwise specified by owner. Excess topsoil shall be removed from the site by the Contractor unless specifically noted otherwise on the Drawings.

B. COORDINATION WITH OTHER WORK – NOT USED

3.05 FIELD QUALITY CONTROL – NOT USED

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION

EARTHWORK, EXCAVATION, BACKFILLING AND COMPACTING 31 23 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: All Earthwork including excavation, trenching, filling and grading for this work includes, but is not necessarily limited to: Site Grading, Undercutting, Excavating Trenches for the installation of utilities, Backfilling trench with bedding material as specified and indicated, finishing filling trench with suitable material to proposed subgrade. Compact & backfill materials in an acceptable manner for borings and casings under roads.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.
- C. DEFINITIONS
1. Backfill: Soil material used to fill an excavation.
 - a. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - b. Final Backfill: Backfill placed over initial backfill to fill a trench.
 2. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.
 3. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
 4. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
 5. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
 - a. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions changes in the Work.
 - b. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
 6. Fill: Soil materials used to raise existing grades.
 7. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
 8. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
 9. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.02 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM) latest edition.
1. ASTM 04.08 - Method for Particle Size Analysis of Soils

2. D698 - Test for Moisture-Density Relations of Soils Using 5.5 lb. (2.5 kg) Rammer and 12-inch (304.8 mm) Drop (Standard Proctor)
 3. D1556 / D1556M - Test for Density of soil in Place by the Sand Cone Method
 4. D1557 - Test for Moisture-Density Relations of Soils Using 10-lb (4.5 Kg) Rammer and 18-inch (457 mm) Drop (Modified Proctor)
 5. 04.03 - Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
 6. D2167 - Test for Density of Soil in Place by the Rubber Balloon Method
 7. D2216 - Laboratory Determination of Moisture content of Soil
 8. D2487 - Classification of Soils for Engineering Purposes
 9. D6938 - Tests for Density of Soil and Soil- Aggregate in Place by Nuclear Methods (Shallow Depth)
 10. D6938 - Test for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
 11. D4318 - Test for Plastic Limit, Liquid Limit, and Plasticity Index of Soils
- B. American Association of State Highway and Transportation Officials (AASHTO) latest edition
1. T 88 - Mechanical Analysis of Soils
 2. T180 - Moisture-Density Relations of Soils Using a 10-lb (4.54 Kg) Rammer and an 18 inch (457 mm) Drop.
 3. M147 - Materials for Aggregate and Soil-Aggregate.

1.03 SUBMITTALS

A. PRODUCT DATA

1. Submit in air tight containers a 10-pound sample of each aggregate or mixture that is to be incorporated into the project to the testing laboratory designated by the owner.
2. Submit the name of each material supplier and specific type and source of each material. Any change in source throughout the job requires approval of the owner or engineer.

B. SHOP DRAWINGS - Shop Drawings or details pertaining to Site Utilities are not required unless use of materials, methods, equipment, or procedures contrary to Drawings or these specifications are proposed. If deviation from the Construction Documents is requested, DO NOT perform work until required shop drawings have been accepted by Owner.

1.04 QUALITY ASSURANCE

A. Independent Testing Laboratory selected and paid by owner, shall be retained to perform construction testing on site based on the following:

1. Building Subgrade Areas, **including** 10'-0" Outside Exterior Building Lines: In cut areas, not less than one compaction test for every 2,500 square feet. In fill areas, same rate of testing for each 8" lift (measured loose).
2. Pavement Subgrade Areas: In cut areas, not less than one compaction test for every 5,000 square feet. In fill areas, same rate of testing for each 8" lift (measured loose).

3. Areas of Construction **exclusive** of building and pavement areas: In cut areas, not less than one compaction test for every 10,000 square feet. In fill areas, same rate of testing for each 8" lift (measured loose). Determine the extent of subgrade stabilization or undercutting on the site.
 4. Test borings shall be made at an interval of one boring for each 1,000 square yards of surface placed for the purpose of verification of thickness. Any area where depth is less than specified on the plans shall be corrected by scarifying, placing additional material and recompacting to the required density. Replacement of test boring areas and any thickness corrections will be at the Contractor's expense.
 5. Verify the Contractor's quantities of undercutting and excavation of unsuitable material.
 6. Classify and approve all fill material that is to be used.
 7. Determine laboratory moisture-density curves of fill material.
 8. Make fill density tests for each lift of compacted fill and approve the density of the lift prior to the Contractor placing another lift. The field density tests shall be taken at a frequency of not less than one test per 1,000 square feet of surface area per lift of fill in the building and pavement areas and wherever the compaction looks questionable
- B. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth these areas until proper compaction is obtained at no additional expense to owner.
- C. In all areas to receive pavement, a CBR (or LBR) test shall be performed for each type of material imported from off-site.
- D. The following tests shall be performed on each type of on-site or imported soil material used as compacted fill as part of construction testing requirements.
1. Moisture and Density Relationship: ASTM D698 or ASTM D1557 or D4253.
 2. Mechanical Analysis: AASHTO T-88
 3. Plasticity Index: ASTM D4318
- E. Field density tests for in-place materials shall be performed according to one of the following standards as part of construction testing requirements.
1. Sand-Cone Method: ASTM D1556 / D1556M
 2. Balloon Method: ASTM D2167
 3. Nuclear Method: ASTM D6938 (Method B-Direct Transmission)
- F. Independent Testing Laboratory shall prepare test reports that indicate test location, elevation data, and test results. Owner, CM, architect, engineer and contractor shall be provided with copies of reports within 96 hours of time test was performed. In event that any test performed fails to meet these Specifications, Owner, CM and contractor shall be notified **immediately** by independent testing laboratory.
- G. All costs related to retesting due to failures shall be paid for by the contractor at no additional expense to owner. Owner shall employ an Independent Testing Laboratory and to direct any testing that is deemed necessary. Contractor shall provide free access to site for testing activities.
- H. Laboratory services are specified to provide technical control for the earthwork and they shall in no way relieve the Contractor of the responsibility of providing the quality of material and workmanship required to meet these Specifications.

- I. Standards: The complete installation shall comply with the applicable local, state and federal ordinances. All work shall be accomplished in a manner that conforms to the applicable provisions of the Occupational Safety and Health Act. Comply with the applicable standards listed above.

PART 2 PRODUCTS

2.01 MATERIALS

- A. GENERAL: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations:
 - 1. Satisfactory Soils: ASTM D2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM, or a combination of these groups; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
 - 2. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D2487, or a combination of these groups.
 - a. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- B. ENGINEERED FILL: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940 / D2940M; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.
- C. BEDDING MATERIAL: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940 / D2940M. Processed sand and gravel free from clay lumps, organic, or other deleterious material, and complying with following gradation requirements:

U.S. Sieve Size	Percent Passing (by weight)
1 Inch	100
3/4 Inch	90-100
3/8 Inch	20-55
No. 4	10
No. 8	0-5

- D. DRAINAGE COURSE: Narrowly graded mixture of crushed stone or crushed or uncrushed gravel; ASTM D448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

E. AGGREGATES

Consist of durable and sound crushed limestone referred to locally as SB-2, free of lumps or balls of clay or other objectionable matter. Crushed limestone shall be free from flat, elongated, soft, or disintegrated pieces. Determine grain size in accordance with ASTM C136 / C136M amount of material finer than 200 mesh sieve in accordance with ASTM C117. Soil binder material, that portion of material passing the No. 40 sieve, shall be of such composition that the composite material conforms to the requirements specified herein. The base course shall be of such nature that it can be compacted readily with watering and rolling to a firm, stable base and shall be a blend of ASTM D448 size number 6 and 10 meeting the following gradation:

<u>Percentage by Weight Passing</u>	
<u>Square Mesh Laboratory Sieves</u>	
<u>Size Numbers</u>	
<u>Sieves</u>	<u>CR610</u>
1-1/2 inch	100
1-inch	90-100
3/4-inch	70-100
1/2 inch	62-90
3/8 inch	50-80
No. 4	40-65
No. 40	12-26
No. 200	5-12

That portion of the material passing the No. 40 sieve shall have a liquid limit of not more than 25 and a plasticity index of not more than 5 as determined by ASTM D4318. Prepare samples in accordance with ASTM 04.08, Procedure A.I.

F. TOPSOIL

1. Topsoil thickness shall be 4 inches minimum.
2. Topsoil: Topsoil for lawn and planting operations shall be fertile, friable, natural loam containing a liberal amount of humus. It shall be free of admixtures and subsoil, and shall be reasonably free of obnoxious weed seed lumps, plants, or other roots, and completely free of stones, sticks, and other extraneous matter, and shall not be used for planting operations while in frozen or muddy condition.

2.02 FINISHES – NOT USED

2.03 ACCESSORIES

- A. WARNING TAPE: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility.

2.04 FABRICATION – NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements
- B. Prior to bidding the Contractor shall visit the site and view the existing site conditions and features. The Contractor shall also communicate with all local utility companies to determine the exact number and location of all utilities. The Contractor shall be responsible for all damages occasioned by his failure to exercise reasonable care to protect existing utilities and other facilities during construction.

3.02 DELIVERY, STORAGE AND HANDLING

- A. STOCKPILING - Stockpile on-site at locations indicated by the owner in such a manner that there will be no standing water or mixing with other materials.
- B. BORROW SITES - Upon completion of borrow operations, clean up borrow areas as indicated on the plans and in a neat and reasonable manner to the satisfaction of the property owner or the engineer.
- C. TRANSPORTATION - Off-site materials shall be transported to the project using well maintained and operating vehicles. Once on the job site, all transporting vehicles shall stay

on designated haul roads and shall at no time endanger any of the improvements by rutting, overloading or pumping the haul road.

3.03 PREPARATION

A. JOB CONDITIONS

1. Set all lines, elevations, and grades for utility and drainage system work and control system for duration of work, including careful maintenance of bench marks, property corners, monuments, or other reference points.
2. Maintain in operating condition existing utilities and drainage systems encountered in utility installation. Repair any surface or subsurface improvements shown on Drawings.
3. Verify location, size, elevation, and other pertinent data required to make connections to existing utilities and drainage systems as indicated on Drawings. Contractor shall comply with local codes and regulations.
4. Over excavate and properly prepare areas of subgrade that are not capable of supporting the proposed systems. These areas are to be stabilized by using acceptable backfill materials placed and compacted as specified, filter fabrics and/or additional bedding material.
5. Install dewatering systems that will be required to construct the proposed utilities in a manner that is described herein.
6. Subsurface Information:
 - a. Data on subsurface conditions is not intended as a representation or warranty of continuity of such conditions between soil borings. Engineer will not be responsible for interpretations or conclusions drawing there from by contractor.
 - b. Additional test borings and other exploratory operations may be made by the Contractor at no cost to Owner.
7. Existing Structures and Utilities:
 - c. Shown on the Drawings are certain surface and underground structures adjacent to the Work. This information has been obtained from existing records. It is not guaranteed to be correct or complete and is shown for the convenience of the Contractor. Contractor shall explore ahead of the required excavation to determine the exact location of all structures. They shall be supported and protected from injury by the Contractor. If they are broken or injured, they shall be restored immediately by the Contractor at his expense.
8. Locate existing underground utilities in the areas of Work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
 - d. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, cooperate with utility owners in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
9. Do not interrupt existing utilities serving facilities occupied and used by City or others, except when permitted in writing and then only after acceptable temporary utility services have been provided.
10. Use of Explosives: Not permitted on the job site.
11. Protection of Persons and Property:
 - e. Barricade open excavations occurring as part of this Work and post with warning lights.
 - f. Operate warning lights during hours from dusk to dawn each day and as otherwise

required.

- g. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.
12. Dust Control: Conduct all operations and maintain the area of activities, including sweeping and sprinkling of roadways, so as to minimize creation and dispersion of dust. Use calcium chloride to control serious or prolonged dust problems.

3.04 CONSTRUCTION

A. SITE AND BUILDING:

1. Excavation for Filling and Grading

- a. Classification of Excavation: Contractor by submitting bid acknowledges that he has investigated site to determine type, quantity, quality, and character of excavation work to be performed. Excavation shall be considered unclassified excavation.
- b. Perform excavation using capable, well maintained equipment and methods acceptable to owner and governing agencies.
- c. When performing grading operations during periods of wet weather, provide adequate drainage and ground water management to control moisture of soils.
- d. Shore and/or brace excavations in accordance with applicable requirements.
- e. Excavated material containing rock or stone greater than 6" in largest dimension is unacceptable as fill within the proposed building and paving area.
- f. Rock or stone less than 6" in largest dimension is acceptable as fill to within 24" of surface of proposed subgrade when mixed with suitable material.
- g. Remove spoil material in areas depicted on the construction drawings and dispose.

2. Filling and Subgrade Preparation

- a. Fill areas to contours and elevations shown with suitable materials. Backfill and fill materials shall be placed in layers not more than 8 inches in loose depth. Before compaction, each layer of backfill or fill material shall be moistened or aerated as necessary to provide the optimum moisture content of the soil material and shall then be compacted to the required percentage of maximum density for each area classification as specified herein. Backfill or fill material shall not be placed on surfaces that are muddy, frozen, icy or contain frost.

3. Compaction

- a. Actual density of each layer of soil material in-place shall be not less than the following percentages of the maximum density of the same soil material determined by the moisture-density test.

Area Classification	Percent Maximum Density
Grassed Areas	90
Structures	98
Building Slabs and Steps	98
Pavement Areas (greater than 6" below subgrade)	95
Pavement Areas (top 6")	100

- b. Immediately following the placing, spread the finished mixture uniformly in a layer and bring to optimum moisture content. The loose thickness and the surface of the layer shall be such that the specified density and the required thickness shall be obtained

after compaction. Compact the layer with steel-faced, vibrating or pneumatic-tired rollers, or other suitable compacting equipment or combination thereof. Continue compacting until the layer is compacted through the full depth to a field density of at least 100 percent of the maximum density at optimum moisture content tested in accordance with ASTM D698 and ASTM D6938. In areas not accessible to rollers or compactors, compact the mixture with mechanical hand tampers. If the mixture is excessively moistened by rain, aerate by blade graders, or other suitable equipment. Aerate until the moisture content of the material is that needed to obtain the required density. Finish the surface of the layer of a combination of rolling and blading. Final surface shall be smooth and free from waves, irregularities, and ruts or soft yielding spots.

4. Moisture Control
 - a. Moisture content in soil material at time of compaction shall be within $\pm 3\%$ of optimum.
 - b. Where the moisture content of a layer of soil material is below optimum before compaction, the required amount of water shall be uniformly applied to the surface of the layer of soil material and the layer disked or otherwise mixed until uniform suitable moisture content is reached.
 - c. Where the moisture of a layer of soil material is above optimum, it shall be dried before compaction until the specified moisture content is achieved.
5. PLACING: Do not dump mixed materials in piles, but place on prepared subgrade or subbase in layers of uniform thickness with a spreader. When a compacted course 6 inches in thickness is required, place material in a single layer. When a compacted course in excess of 6 inches is required, place material in layers of equal thickness. Do not exceed 6 inches or have less than 3 inches in thickness for any compacted layer. Place layers so that when compacted, they will be true to grades or levels required with the least possible surface disturbance. Where the base course is constructed in more than one layer, clean previously constructed layers of loose and foreign matter. Maintain material water content during the placing period to obtain the compaction specified. Make adjustments in placing procedures or equipment to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to insure a satisfactory base course.
6. Maintenance of Subgrade
 - a. Finished subgrades shall be verified to ensure proper elevation and conditions for construction above subgrade.
 - b. Protect subgrade from excessive wheel loading during construction, including concrete trucks and dump trucks.
 - c. Remove areas of finished subgrade found to have insufficient compaction density to depth necessary and replace in a manner that will comply with compaction requirements by use of material equal to or better than best subgrade material on site. Surface of subgrade after compaction shall be hard, uniform, smooth, stable, and true to grade and cross-section.
7. Finish Grading
 - a. Grade all areas where finish grade elevations or contours are indicated on Drawings, other than paved areas and buildings, including excavated areas, filled and transition areas, and landscaped areas. Graded areas shall be uniform and smooth, free from rock, debris, or irregular surface changes. Finished surface shall not be more than **0.10 feet** above or below established finished subgrade elevation, and all ground surfaces shall vary uniformly between indicated elevations. Finish ditches shall be graded to allow for proper drainage without ponding and in a manner that will minimize erosion potential.
 - b. Correct all settlement and eroded areas within one year after date of completion at additional expense to owner. Bring grades to proper elevation. Replant or replace any

grass, shrubs, bushes, or other vegetation disturbed by construction using corrective measures. Refer to Section 31 25 00 for slope protection and erosion control.

B. UTILITY WORK

1. Excavation

- a. Dig trench at proper width and depth for laying pipe, conduit, or cable. Cut trench banks practically and remove stones as necessary to avoid point-bearing. Over excavate wet or unstable soil, if encountered, from trench bottom as necessary to provide suitable base for continuous and uniform bedding.
- b. Perform excavation as indicated for specified depths. During excavation, stockpile materials suitable for backfilling in orderly manner far enough from bank of trench to avoid overloading, slides, or cave-ins.
- c. Remove excavated materials not required or not suitable for backfill or embankments and waste as specified. Any structures discovered during excavation(s) shall be disposed of as specified.
- d. Prevent surface water from flowing into trenches or other excavations by temporary grading or other methods, as required. Remove accumulated water in trenches or other excavations by pumping or other acceptable methods.
- e. Open cut excavation by suitable means. Where machines other than ladder or wheel-type trenching machines are used, do not use clods for backfill. Dispose of unsuitable material and provide other suitable material at no additional cost to Owner. In paved areas where open cut installation is permitted, the pavement shall be cut by concrete saw or other approved method. Cuts shall be in straight lines parallel to the utility line location and shall be to a depth of at least one quarter of the pavement thickness. The remainder of the pavement shall be broken out. Pavement shall be removed a minimum of 12 inches on each side of the trench and 6 inches beyond where the base course is to be removed.
- f. Accurately grade trench bottom to provide uniform bearing and support for each section of pipe on bedding material at every point along entire length, except where necessary to excavate for bell holes, proper sealing of pipe joints, or other required connections. Dig bell holes and depressions for joints after trench bottom has been graded. Dig no deeper, longer, or wider than needed to make joint connection properly.
- g. Trench width requirements below the top of the pipe shall not be less than 5" nor more than 8" wider than outside surface of any pipe or conduit that is to be installed to designated elevations and grades. All other trench width requirements for pipe, conduit, or cable shall be least practical width that will allow for proper compaction of trench backfill.
- h. Trench depth requirements measured from finished grade or paved surface shall meet the following requirements or applicable codes and ordinances:
 - i. Water Mains: 36" to top of pipe barrel or 6" below the frost line (established by the local building official), whichever is deeper.
 - ii. Sanitary Sewer: Elevations, and grades as indicated on Drawings.
 - iii. Storm Sewer: Depths, elevations, and grades as shown on Drawings.
 - iv. Electrical Conduits: 24" minimum to top of conduit or as required by NEC 300-5, NEC 710-36 codes, or the local utility company requirements, whichever is deeper.
 - v. TV Conduits: 18" minimum to top of conduit or as required by the local utility company, whichever is deeper.
 - vi. Telephone Conduits: 18" minimum to top of conduit, or as required by the local utility company, whichever is deeper.
 - vii. Gas Mains and Service: 30" minimum to top of pipe, or as required by the local utility company, whichever is deeper.
- i. Provide sheeting and bracing, when necessary, in trenches and other excavations where protection of workmen required. Sheeting may be removed after sufficient backfilling to protect against damaging or injurious caving.

2. Bedding
 - a. Accurately cut trenches for pipe or conduit that is installed to designated elevations and grades to line and grade from 4" below bottom of pipe and to width as specified. Place 4" of bedding material, compact in bottom of trench, and accurately shape to conform to lower portion of pipe barrel. After pipe installation, place select backfill and compact in maximum 6" layers measured loose to a level of 1 foot above the top of the pipe or conduit.
 - b. Place geotextile fabric as specified on the plans and/or specifications.
3. Backfilling
 - a. Criteria: Trenches shall not be backfilled until required tests are performed and the utility systems comply with and are accepted by applicable governing authorities.
 - b. Backfill trenches as specified. If improperly backfilled, reopen to depth required to obtain proper compaction. Backfill and compact, as specified, to properly correct condition in an acceptable manner.
 - b. Backfilling: After pipe or conduit has been installed, bedded, and tested as specified, backfill trench or structure excavation with specified material placed in 8" maximum loose lifts.
 - c. Backfill trenches to the contours and elevations shown on the plans with suitable materials.
 - d. Fill consisting of granular soils shall be compacted to at least 100 percent of the standard Proctor density when impact compaction will produce a well-defined moisture-density relationship curve. When the granular soils are of a free draining type for which impact compaction will not produce a well-defined moisture-density relationship curve, the fill shall be compacted to at least 75 percent relative density per ASTM D4253.
 - e. Compact each lift in accordance with the compaction requirements contained for the applicable area type.
 - f. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
4. Compaction
 - a. Exercise proper caution when compacting immediately over top of pipes or conduits. Water jetting or flooding is not permitted as method of compaction.
 - b. Maintain optimum moisture content of fill materials to attain required compaction density.
 - c. An independent testing laboratory shall perform test at intervals not exceeding 200'-0" of trench for the first and every other eight-inch (8") lift to compacted trench backfill and furnish copies of test results as specified. Compact to minimum density of 95% of optimum density in accordance with ASTM D698 (or 92% of optimum density in accordance with ASTM D1557).
 - d. All materials used for backfilling shall be tested.
5. Boring and Jacking
 - a. Where utilities beneath concrete and asphaltic pavement shall be installed by boring and jacking, the boring and jacking installation shall be performed by workers experienced in such operations, with equipment designed and regularly used for this work. The bored opening shall be kept to the minimum size practical for the installation of the utility. When a void greater than 1 inch exists between the bored opening and outside edge of the utility installation, the void shall be filled with grout under pressure, as approved by the Owner's representative.

3.05 FIELD QUALITY CONTROL – See 1.04 QUALITY ASSURANCE

3.06 ADJUSTING AND PROTECTION OF WORK

A. RESTORATION OF SURFACES

1. Areas within the limits of earthwork under this section, including adjacent transition areas, shall be uniformly graded. The finished surface shall be smooth within the specified tolerances, compacted, and with uniform levels or slopes between points where elevations are indicated or between such points and existing grades.
2. Grassed areas: The finished surface of areas to receive topsoil blend shall be not more than 0.10-foot above or below the specified finish elevations.
3. Walks: The surface of areas under walks shall be shaped to line, grade, and cross section, and the finished surface shall be not more than 0.0 foot above or 0.10-foot below the specified finish elevations.
4. Pavements: The surface of areas under pavements shall be shaped to line, grade, and cross section, and the finished surface shall be not more than 1/2-inch above or below the specified finish elevations.

B. PROTECTION

1. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
2. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
3. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - a. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

C. DISPOSAL OF SURPLUS AND WASTE MATERIALS

1. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

PART 4 SCHEDULES – NOT USED

END OF SECTION

SLOPE PROTECTION AND EROSION CONTROL 31 25 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Included in the section is information regarding temporary control measures to control erosion and water pollution, through the use of temporary and permanent erosion control systems and slope protection systems.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.
- C. REFERENCES –
 - A. State of Arkansas Department of Transportation
 - B. ASTM - American Society for Testing and Materials

1.02 SUBMITTALS – NOT USED

1.03 QUALITY ASSURANCE – NOT USED

1.04 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.
- B. DESIGN / PERFORMANCE REQUIREMENTS
 - 1. Environmental Requirements: The contractor shall protect adjacent properties and water resources from erosion and sediment damage throughout the life of the contract.

1.05 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

- A. BINDERS
 - 1. Synthetic Soil Binders: Calcium chloride, or other standard manufacturer's spray on adhesives designed for dust suppression.
 - 2. Geosynthetic Binders: Geosynthetic binders shall be manufactured in accordance with ASTM D1560, ASTM D2844 / D2844; and shall be referred to as products manufactured for use as modified emulsions for the purpose of erosion control and soil stabilization. Emulsions shall be manufactured from all natural materials and provide a hard-durable finish.
- B. MULCH
 - 1. Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region.
 - 2. Straw shall be stalks from oats, wheat, rye, barley, or rice, furnished in air-dry condition and with a consistency for placing with commercial mulch-blowing equipment.

3. Hay shall be native hay, sudan-grass hay, broomsedge hay, or other herbaceous mowings, furnished in an air-dry condition suitable for placing with commercial mulch-blowing equipment.
 4. Wood cellulose fiber shall not contain any growth or germination-inhibiting factors and shall be dyed an appropriate color to facilitate placement during application. Composition on air-dry weight basis: a minimum 9 to a maximum 15 percent moisture, and between a minimum 4.5 to a maximum 6.0 pH.
 5. Paper fiber mulch shall be recycled news print that is shredded for the purpose of mulching seed.
 6. Shredded Bark shall be locally shredded material treated to retard the growth of mold and fungi.
 7. Wood By-Products shall be wood locally chipped or ground bark shall be treated to retard the growth of mold and fungi. Gradation: A maximum 2-inch-wide by 4 inch long.
 8. Coir shall be manufactured from 100 percent coconut fiber cured in fresh water for a minimum of 6 months.
 9. Asphalt adhesive shall conform to the following: Emulsified asphalt, conforming to ASTM D977, Grade SS-1; and cutback asphalt, conforming to ASTM D2028 / D2028M, Designation RC-70.
 10. Mulch control netting may be constructed of lightweight recycled plastic, cotton, or paper or organic fiber. The recycled plastic shall be a woven or nonwoven polypropylene, nylon, or polyester containing stabilizers and/or inhibitors to make the fabric resistant to deterioration from UV.
 11. Hydraulic mulch shall be made of 100 percent virgin aspen wood fibers. Wood shall be naturally air-dried to a moisture content of 10.0 percent, plus or minus 3.0 percent. A minimum of 50 percent of the fibers shall be equal to or greater than 0.15 inch in length and a minimum of 75 percent of the fibers shall be retained on a 28-mesh screen. No reprocessed paper fibers shall be included in the hydraulic mulch.
- C. TACKIFIER: Tackifier shall be a blended polyacrylimide material with non-ionic galactomannan of Gramineae endosperm in powder and crystalline form with molecular weights over 250,000. Tackifier shall be pre-packaged in the hydraulic mulch at a rate as recommended by the manufacturer.
- D. DYE: Dye shall be a water-activated, green color. Dye shall be pre-packaged in water dissolvable packets in the hydraulic mulch.
- E. SILT FENCE
1. Filter Fabric: The geotextile shall comply with the requirements of ASTM D4439, and shall consist of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. The filament shall consist of a long-chain synthetic polymer composed of at least 85 percent by weight of ester, propylene, or amide, and shall contain stabilizers and/or inhibitors added to the base plastic to make the filaments resistance to deterioration due to ultraviolet and heat exposure. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0 to 120 degrees F. The filter fabric shall meet the following requirements:

FILTER FABRIC FOR SILT SCREEN FENCE

PHYSICAL PROPERTY TEST PROCEDURE		STRENGTH REQUIREMENT
Grab Tensile Elongation (%)	ASTM D 4632	100 lbs. min. 30 % max.
Trapezoid Tear	ASTM D 4533	55 lbs. min.
Permittivity	ASTM D 4491	0.2 sec-1
AOS (U.S. Std Sieve)	ASTM D 4751	20-100

2. Silt Fence Stakes and Posts

The Contractor may use either wooden stakes or steel posts for fence construction. Wooden stakes utilized for silt fence construction, shall have a minimum cross section of 2 inches by 2 inches when oak is used and 4 inches by 4 inches when pine is used, and shall have a minimum length of 5 feet. Steel posts (standard "U" or "T" section) utilized for silt fence construction, shall have a minimum weight of 1.33 pounds per linear foot and a minimum length of 5 feet.

F. EROSION CONTROL BLANKETS

1. Erosion Control Blankets Type I

a. Type I blankets shall be used for erosion control and vegetation establishment on roadside embankments, abutments, berms, shoulders, and median swales where natural vegetation will provide long term stabilization. Erosion control blankets shall be a machine-produced mat of 100% straw. The blanket shall be of consistent thickness with the straw evenly distributed over the entire area of the mat. The blanket shall be covered on the top side with a photodegradable polypropylene netting having an approximate 1/2 by 1/2-inch mesh and be sewn together on a maximum 1.5 inch centers with degradable thread. The erosion control blanket shall be 100 percent straw with a weight of approximately 0.5 lb/SY. Photodegradable life shall be a minimum of 2 months with a minimum 90 percent light penetration.

2. Erosion Control Blankets Type II

a. Erosion control blankets shall be a machine-produced mat of 100 percent straw. The blanket shall be of consistent thickness with the straw evenly distributed over the entire area of the mat. The blanket shall be covered on the top side with a polypropylene netting having an approximate 1/2 by 1/2-inch mesh with photodegradable accelerators to provide breakdown of the netting within approximately 45 days, depending upon geographic location and elevation. The blanket shall be sewn together on a maximum 1.5 inch centers with degradable thread. The erosion control blanket shall be 100 percent straw with approximately 0.50 lb/yd² weight. Photodegradable life shall be a minimum of 10 months with a minimum 90 percent light penetration.

3. Erosion Control Blankets Type III

a. Type III blankets shall be used for erosion control and vegetation establishment on roadside embankments, abutments, berms, shoulders, and median swales where natural vegetation will provide long term stabilization. Erosion control blanket shall be a machine-produced mat consisting of 70 percent straw and 30 percent coconut fiber. The blanket shall be of consistent thickness with the straw and coconut fiber evenly distributed over the entire area of the mat. The blanket shall be covered on the top side with heavyweight photodegradable polypropylene netting having UV additives to delay breakdown and an approximate 5/8 by 5/8-inch mesh, and on the bottom side with a lightweight photodegradable polypropylene netting with an approximate 1/2 inch by 1/2 inch mesh. The blanket shall be sewn together on 1.5 inch centers with degradable

thread. The erosion control blanket shall be composed of approximately 70 percent straw (approximately 0.35 lb/yd²) and 30 percent Coconut Fiber (approximately 0.15 lb/yd² weight). Photodegradable life shall be a minimum of 10 months with a minimum 90 percent light penetration.

4. Erosion Control Blankets Type IV (Turf Reinforcement Mat)

- a. Permanent erosion control/turf reinforcement mat shall be constructed of 100 percent UV stabilized high denier polypropylene fiber sewn between a black UV stabilized 1/2-inch mesh polypropylene netting on the top (5 lbs/1000 square ft) and a black UV stabilized 5/8-inch mesh polypropylene netting on the bottom (3 lbs/1000 square ft) with polypropylene thread. Thickness measured in accordance with ASTM D 1777 shall be a minimum of 0.56 inches. Weight shall be approximately 11.2 oz/sy. The mat shall be resistant to photo and chemical degradation.

5. Erosion Control Blankets Type V (Re-vegetation Mat)

- a. Seed-incorporated blanket option shall consist of 2-ply 100 percent recycled, unbleached, cellulose tissue. A seed mix shall be uniformly distributed upon the bottom ply of cellulose tissue and fully overlaid with a top cellulose ply to provide complete envelopment of the seed layer. The seed-incorporated cellulose medium shall be sewn to the bottom side of the specified erosion control blanket.

G. STAKING: Stakes shall be 100 percent biodegradable manufactured from recycled plastic or wood and shall be designed to safely and effectively secure erosion control blankets for temporary or permanent applications. The biodegradable stake shall be fully degradable by biological activity within a reasonable time frame. The bio-plastic resin used in production of the biodegradable stake shall consist of polylactide, a natural, completely biodegradable substance derived from renewable agricultural resources. The biodegradable stake must exhibit ample rigidity to enable being driven into hard ground, with sufficient flexibility to resist shattering. The biodegradable stake shall have serrations on the leg to increase resistance to pull-out from the soil.

H. STAPLES: Staples shall be as recommended by the manufacturer.

I. CRUSHED ROCK: Crushed rock shall be crushed run between a minimum 1.5 inches and a maximum 4 inches.

J. GRAVEL: Gravel shall be river run between a minimum 1 inches and a maximum 4 inches.

K. WATER: Unless otherwise directed, water shall be the responsibility of the Contractor. Water shall be potable or supplied by an existing irrigation system.

2.02 FINISHES – NOT USED

2.03 ACCESSORIES – NOT USED

2.04 FABRICATION – NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING – NOT USED

3.03 PREPARATION

- A. Review site erosion control plan, Stormwater Pollution Prevention Plan (SWPPP), and Arkansas General Permit for Stormwater Discharges Associated with Construction Activity.

- B. All contractors and subcontractors engaged in land-disturbing activities related to the project, must:
 - 1. Sign and submit to the Arkansas Department of Environment and Conservation, Division of Water Pollution Control a Notice of Intent form.
 - 2. Sign the certification on the SWPPP.
- C. All contractors and subcontractors are responsible for submitting a Notice of Termination upon completion of the project or their respective work related to the project.
- D. Deficiencies or changes in the erosion control plan or SWPPP as applied to current conditions will be brought to the attention of the Engineer for remedial action.

3.04 CONSTRUCTION:

A. Erosion Control and Slope Protection Implementation

- 1. Place erosion control systems in accordance with the erosion control plan, SWPPP and requirements of the General NPDES Permit for Storm Water Discharges Associated with Construction Activity.
- 2. The engineer has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and to direct the contractor to provide immediate permanent or temporary pollution control measures. The contractor will be required to incorporate all permanent erosion control features into the project at the earliest practical time to minimize the need for temporary controls. Cut slopes shall be permanently seeded and mulched as the excavation proceeds to the extent considered desirable and practical.
- 3. The contractor shall perform required inspections in accordance with the schedules outlined in the SWPPP and shall be responsible for filing any required reports to local, state, or federal authorities.
- 4. The temporary erosion control systems installed by the contractor shall be maintained as directed by the engineer to control erosion and siltation at all times during the life of the contract. The contractor must respond to any maintenance or additional work ordered by the engineer within a 48-hour period.
- 5. Placement of Erosion Control Blankets
 - a. Before placing the erosion control blankets, ensure the subgrade has been graded smooth; has no depressed, void areas; is free from obstructions, such as tree roots, projecting stones or other foreign matter. Vehicles shall not be permitted directly on the blankets.

B. Stabilization

- 1. The stabilization practices to be implemented shall include temporary seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, erosion control matts, protection of trees, preservation of mature vegetation, etc. The Contractor shall record the dates when the major grading activities occur, (e.g., clearing and grubbing, excavation, embankment, and grading); when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated. Except as provided in paragraphs UNSUITABLE CONDITIONS and NO ACTIVITY FOR LESS THAN 21 DAYS, stabilization practices shall be initiated as soon as practicable, but no more than 14 days, in any portion of the site where construction activities have temporarily or permanently ceased.

3.05 FIELD QUALITY CONTROL

A. Site Tests, Inspection

1. General - The Contractor shall inspect disturbed areas of the construction site, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, stabilization practices, structural practices, other controls, and area where vehicles exit the site at least once every seven (7) calendar days and within 24 hours of the end of any storm that produces 0.5 inches or more rainfall at the site. Where sites have been finally stabilized, such inspection shall be conducted at least once every month.
2. Inspections Details - Disturbed areas shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the Storm Water Pollution Prevention Plan shall be observed to ensure that they are operating correctly. Discharge locations or points shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Locations where vehicles exit the site shall be inspected for evidence of offsite sediment tracking.
3. Inspection Reports - For each inspection conducted, the Contractor shall prepare a report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the Storm Water Pollution Prevention Plan, maintenance performed, and actions taken. The report shall be furnished to the Owner within 24 hours of the inspection. A copy of the inspection report shall be maintained on the job site.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

- A. The temporary erosion control features installed by the Contractor shall be acceptably maintained by the Contractor until no longer needed or permanent erosion control methods are installed. Any materials removed shall become the property of the Contractor.
- B. In the event that temporary erosion and pollution control measures are required due to the Contractor's negligence, carelessness, or failure to install permanent controls as a part of work as scheduled, and are ordered by the ENGINEER, such work shall be performed by the Contractor at his own expense.
- C. Where the work to be performed is not attributed to the Contractor's negligence, carelessness, or failure to install permanent controls and falls within the specifications for a work item that has a contract price, the units of work shall be paid for at the proper contract prices.

PART 4 SCHEDULES – NOT USED

END OF SECTION

TERMITE TREATMENT 31 31 16

PART 1 GENERAL

1.01 SUMMARY

- A. Provide soil treatment for termite control at the end of earthwork operations.

1.02 SUBMITTALS

- A. Submit for approval product data, warranty.

1.03 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in a similar service for three years. Use experienced installers. Deliver, handle, and store materials in accordance with manufacturer's instructions.

1.04 WARRANTY

- A. Provide written warranty agreeing to re-treat soil and repair damage caused by termite infestation during the 5-year period from date of substantial completion.

1.05 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

- A. An insecticide proven to prevent infestation, acceptable to authorities having jurisdiction, and not injurious to plants and landscaping.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Treat soil in strict compliance with National Pest Control Association standards and with manufacturer's printed instructions and recommendations.
- B. Do not begin treatment work until all excavation, filling and grading is completed. Do not apply treatment to frozen or excessively wet soil.
- C. Post signs and other warnings indicating that soil poisoning has been applied. Protect persons and property from injury or damage from soil treatment work.

END OF SECTION

DIVISION - 32 EXTERIOR IMPROVEMENTS

- 32 11 26 PAVING BASE COURSE
- 32 12 16 ASPHALTIC CONCRETE PAVING
- 32 17 23 PAVEMENT MARKINGS
- 32 31 00 NON-SECURITY FENCES AND GATES
- 32 92 19 SEEDING

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Compaction and installation requirements of mineral aggregate base course for roads, driveways, and parking areas as a wearing surface and as a subbase for asphaltic concrete paving.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.
- C. DEFINITIONS
 - 1. Mineral Aggregate Base Course: Premixed base materials of crushed stone mixed with binder material and water and is compacted in layers on previously prepared subgrade to a finished thickness and in areas specified on drawings.
 - 2. Stabilized Aggregate Base: Same as Mineral Aggregate Base Course.
 - 3. Crusher Run: Same as Mineral Aggregate Base Course.
 - 4. Crushed Stone: Aggregate mixture conforming to AASHTO Standard Specification M-147, latest revision, Gradation C.

1.02 REFERENCES

- A. ANSI/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.
- B. ANSI/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.
- C. ASTM D2167 - Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
- D. ASTM D1556 / D1556M - Test Method for Density of Soil in-place by the Sand-Cone Method.
- E. ASTM D6938 - Test Methods for Density of Soil and Soil- Aggregate in Place by Nuclear Methods (Shallow Depth), Method B (Direct Transmission).
- F. ASTM D6938 — Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.
- G. ARDOT, Bureau of Highways "Standard Specifications for Road and Bridge Construction," Current Edition.

1.03 SUBMITTALS

- A. PRODUCT DATA: Submit materials certificate signed by material producer and Contractor, certifying that materials comply with, or exceed, the requirements herein.

1.04 QUALITY ASSURANCE – NOT USED

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

A. Aggregate

1. Base course mixtures and materials shall meet the requirements of Sections 303 and 903.05 of the Arkansas Department of Transportation Standard Specifications for Road and Bridge Construction, Latest Edition for the gradation indicated on the drawings.

2.02 FINISHES – NOT USED

2.03 ACCESSORIES – NOT USED

2.04 FABRICATION – NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

A. REFER TO DIVISION 1 for General Requirements

B. Review of Existing Conditions

1. Verify substrate has been inspected, gradients and elevations are correct, and substrate is dry.

3.02 DELIVERY, STORAGE AND HANDLING – NOT USED

3.03 PREPARATION – NOT USED

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. Perform base course construction in a manner that will drain surface properly at all times and at the same time prevent runoff from adjacent areas from draining onto base course construction.
2. If the required compacted depth of the base course exceeds six (6) inches, construct the base in two or more layers of approximately equal thickness. The maximum compacted thickness of any one layer shall not exceed six (6) inches.
3. Compact base material to an average density of not less than 95% of standard proctor density as determined by ASTM D 698, with no individual test less than 92% of standard proctor density.
4. Construct the surface of each layer so that the aggregates become firmly keyed, and a uniform texture produced and maintained until covered by the following stage of construction.

3.05 FIELD QUALITY CONTROL

A. Site Tests, Inspection

1. An Independent Testing Laboratory, selected and paid by Owner, shall be retained to perform construction testing of in-place base courses for compliance with requirements for thickness and tolerance. Paving base course tolerances shall be verified to +0.05' of design elevation that allow for paving thicknesses as shown in the Drawings. The contractor shall provide instruments and a suitable benchmark.

2. The following tests shall be performed on each type of material used as base course material:
 - a. Moisture and Density Relationship: ASTM D 698 or ASTM D 1557.
 - b. Mechanical Analysis: AASHTO T-88.
 - c. Plasticity Index: ASTM D-4318.
 - d. Base material thickness: Perform one test for each 5,000 square feet in-place base material area.
 - e. Base material compaction: Perform one test in each lift for each 5,000 square feet in-place base material area.
 - f. Test each source of base material for compliance with applicable latest state highway specifications.
3. Field density tests for in-place materials shall be performed according to one of the following standards as part of construction testing requirements:
 - a. Sand-Cone Method: ASTM D1556 / D1556M.
 - b. Balloon Method: ASTM D2167.
 - c. Nuclear Method: ASTM D6938, Method B (Direct Transmission).
 - d. Testing frequency shall be one density test per 5,000 square feet for each layer of base.
4. Independent Testing Laboratory shall prepare test reports that indicate test location, elevation data, and test results. Owner, Architect, and Engineer, and Contractor shall be provided with copies of reports within 96 hours of time test was performed. In the event that any test performed fails to meet these Specifications, Owner and Contractor shall be notified immediately by Independent Testing Laboratory. The owner shall employ an Independent Testing Laboratory and to direct any testing that is deemed by them to be necessary. Contractor shall provide free access to site for testing activities.

PART 4 SCHEDULES – NOT USED

END OF SECTION

ASPHALTIC CONCRETE PAVING 32 12 16

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Construction of hot-mixed, hot-laid bituminous pavement on prepared base or existing pavement course. Included in the specification is asphaltic concrete paving, surface course, binder course and base course.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.
- C. DEFINITIONS
 - 1. Traffic Surfaces: Streets, aprons, driveways, alleys, parking areas, sidewalks, curbs and gutters, and any sub-base, base or other materials, associated with vehicular or pedestrian traffic except dirt and gravel shoulders.

1.02 REFERENCES

- A. MS-2-Mix design methods for asphalt concrete and other hot mix types - The Asphalt Institute (AI)
- B. MS-3-Asphalt Plant Manual - The Asphalt Institute (AI)
- C. Hot Mix Asphalt Paving Handbook - US Army Corp of Engineers, UN-13 (CE MP-ET)
- D. MS-19-Basic Asphalt Emulsion Manual - The Asphaltic Institute (AI)
- E. ASTM D946 / D946M - Penetration - Graded Asphalt Cement for use in Pavement Construction
- F. American Association of State Highway and Transportation Officials (AASHTO)
- G. Arkansas State Highway and Transportation Department Standard Specifications for Highway Construction (AHTD Standards), Latest Edition.

1.03 SUBMITTALS

A. PRODUCT DATA

- 1. Design Mix: Before any asphaltic concrete paving is constructed, submit the actual design mix to the Engineer for review and/or approval. Design mix submittal shall follow the format as indicated in the Asphalt Institute Manual MS-2, Marshall Stability Method; and shall include the type/name of the mix, gradation analysis, grade of asphalt cement used, Marshall Stability (lbs.), flow, effective asphalt content (percent), and direct references to the applicable highway department specifications sections for each material. The design shall be for a mixture listed in the current edition of the applicable state roadway specifications. Mix designs that have been approved by the Arkansas Department of Transportation within the previous 12 months do not require approval; submit copy of approval to the Engineer.
- 2. Material Certificates: Submit materials certificate to on-site independent testing laboratory, which is signed by material producer and Contractor, certifying that materials comply with, or exceed, the requirements herein.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide asphalt-aggregate mixture as called for in the plans. Use locally available materials and gradations which meet state highway specifications and exhibit satisfactory records on previous installations.
- B. Asphalt Cement: Comply with AASHTO M 226/ASTM D3381 / D3381M; Table 2 AC-10, AC-20, or AC-30, AR-80, viscosity grade, depending on local mean annual air temperature. (See chart below):

Temperature Condition	Asphalt Grades
Cold, mean annual air temperature ≤ 7 degrees C (45 degrees F)	AC-10 85/100 pen.
Warm, mean annual air temperature between 7 degrees C (45 degrees F) and 24 degrees C (75 degrees F)	AC-20 60/70 pen.
Hot, mean annual air temperature ≥ 24 degrees C (75 degrees F)	AC-30

Final acceptance of the proper grade of AC shall be made by the Engineer.

- C. Prime Coat: A medium curing cut-back asphalt or an asphalt penetrating prime coat consisting of either MC- 30 or SS-1h.
- D. Tack Coat: Emulsified asphalt; AASHTO M 140, ASTM D5276 or AASHTO M 208, ASTM D2397 / D2397M, SS-1h, CSS-1, or CSS-1h, diluted with one part water to one-part emulsified asphalt.
- E. Mineral Filler: Rock or slag dust, hydraulic cement, or other inert material complying with AASHTO M 17, ASTM D242 / D242, if recommended by applicable state highway standards.
- F. Asphalt-Aggregate Mixtures: Various plant-mix asphalt-aggregate mixtures as called for in the plans, meeting the requirements of the Arkansas Department of Transportation specifications for aggregate type, aggregate gradation, asphalt content, Marshall Stability, void content, dust-asphalt ratio, flow and stripping for each mixture grading.

2.02 FINISHES – NOT USED

2.03 ACCESSORIES

- A. Equipment
 - 1. Maintain equipment in satisfactory operating condition and correct breakdowns in a manner that will not delay or be detrimental to progress of paving operations.

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING

- A. Trucks shall have tight, clean, smooth metal beds which have been coated to prevent mixture from adhering to the beds. Cover trucks to protect mixture from weather.
- B. Deliver mixture to the site at the specified temperature.

3.03 PREPARATION

A. JOB CONDITIONS

1. Weather Limitations:
 - a. Apply prime and tack coats when ambient temperature is above 40°F, and when temperature has been above 35°F for 12 hours immediately prior to application. Do not apply it when base is wet, contains excess moisture, or during rain.
 - b. Construct asphaltic concrete paving when atmospheric temperature is above 40°F and rising.
2. Grade Control: Establish and maintain the required lines and grades, including crown and cross-slope for each course during construction operations.

B. SURFACE PREPARATIONS

1. Remove loose material from compacted base material surface immediately before applying prime coat.
2. Proof roll prepared base material surface to check for areas requiring additional compaction and areas requiring removal and recompacting.
3. Do not begin paving work until deficient base material areas have been corrected and are ready to receive paving.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. Applications
 - a. Prime Coat:
 - i Apply bituminous prime coat to all base material surfaces where asphaltic concrete paving will be constructed.
 - ii Apply bituminous prime coat in accordance with APWA Section 2204 and applicable state highway specifications.
 - iii Apply at minimum rate of 0.25 gallon per square yard over compacted base material. Apply to penetrate and seal, but not flood surface.
 - iv Make necessary precautions to protect adjacent areas from overspray.
 - v Cure and dry as long as necessary to attain penetration and evaporation of volatiles.
 - b. Tack Coat:
 - i Apply to contact surfaces of previously constructed asphaltic concrete base courses or portland cement concrete and surfaces abutting or projecting into asphalt concrete and surfaces abutting or projecting into asphalt concrete pavement.
 - ii Apply tack coat to asphaltic concrete base course or sand asphalt base course. Apply emulsified asphalt tack coat between each lift or layer of full depth asphaltic concrete and sand asphalt bases and on surface of all such bases where asphaltic concrete paving will be constructed.

- iii Apply emulsified asphalt tack coat in accordance with APWA Section 2204 and applicable state highway specifications.
- iv Apply at minimum rate of 0.05 gallon per square yard of surface.
- v Allow it to dry until at proper condition to receive paving.

2. Asphaltic Concrete Placement

- a. Place asphalt concrete mixture on completed compacted subgrade surface, spread, and strike off. Spread mixture at following minimum temperatures:
 - i When ambient temperature is between 40° F and 50° F: 285° F.
 - ii When ambient temperature is between 50° F and 60° F: 280° F.
 - iii When ambient temperature is higher than 60° F: 275° F.
- b. Whenever possible, all pavements shall be spread by a finishing machine. Inaccessible or irregular areas, pavement may be placed by hand methods. The hot mixture shall be spread uniformly to the required depth with hot shovels and rakes. After spreading, the hot mixture shall be carefully smoothed to remove all segregated course aggregate and rake marks. Rakes and lutes used for hand spreading shall be of the type designed for use on asphalt mixtures. Loads shall not be dumped faster that they can be properly spread. Workers shall not stand on the loose mixture while spreading.
- c. Paving Machine Placement: Apply successive lifts of asphaltic concrete in transverse directions with the surface course placed in the direction of surface-water flow. Place in typical strips not less than 10'-0" wide.
- d. Joints: Make joints between old and new pavements, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have the same texture, density, and smoothness as other sections of asphalt concrete course. Clean contact surfaces and apply a tack coat.

3. Rolling and Compaction

- a. The mixture, after being spread, shall be thoroughly compacted by rolling as soon as it bears the weight of the rollers without undue displacement. The number, weight, and types of rollers and sequences of rolling operations shall be such that the required density and surface are consistently attained while the mixture is in a workable condition. Roller drums and wheels should be kept moistened with water to prevent adhesion of the asphalt mixture.
- b. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
- c. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, with hot material.
- d. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue rolling for the second rolling until mixture has been thoroughly compacted.
- e. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and the course has attained maximum density.
- f. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot asphalt concrete. Compact by rolling to maximum surface density and smoothness.
- g. Protection: Do not permit rollers to park on asphalt pavement. After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked. Do not permit equipment or vehicles to be refueled on asphalt pavement.

3.05 FIELD QUALITY CONTROL

A. Site Tests, Inspection

1. Independent Testing Laboratory, selected and paid by Owner, shall be retained to perform construction testing of in-place asphaltic concrete courses for compliance with requirements for thickness and surface smoothness. Asphaltic surface and base courses shall be randomly cored at a minimum rate of one core for every 10,000 square feet of paving. However, no less than three cores in light duty areas and three cores in heavy duty areas shall be obtained. Coring holes shall be immediately filled with full-depth asphalt or with concrete. Asphaltic Concrete pavement samples shall be tested for conformance with the mix design.
2. Grade Control: Establish and maintain required lines and elevations, avoid depressions that will allow water to pond.
3. Thickness: In-place compacted thickness shall not be less than thickness specified on the drawings. Areas of deficient paving thickness shall receive a tack coat and a minimum 1" overlay; or shall be removed and replaced to the proper thickness, at the discretion of the Owner until specified thickness of the course is met or exceeded at no additional expense to the Owner.
4. Surface Smoothness: Testing shall be performed on the finished surface of each asphalt concrete course for smoothness, using 10'-0" straightedge applied parallel with, and at right angles to centerline of paved area. The results of these tests shall be made available to the owner upon request. Surfaces will not be acceptable if exceeding following tolerances for smoothness:

Base Course Surface: 1/4"
Wearing Course Surface: 3/16"

5. Check surface areas at intervals necessary to eliminate ponding areas. Remove and replace unacceptable paving as directed by Owner.
6. Compaction: Field density test for in-place materials shall be performed by examination of field cores in accordance with one of the following standards:
 - a. Bulk specific gravity of paraffin-coated specimens: ASTM D1188.
 - b. Bulk specific gravity using saturated surface-dry specimens: ASTM D2726 / D2726M.
 - c. Density requirements for the various mix gradations shall be in accordance with Tennessee Department of Transportation specifications.
7. Areas of insufficient compaction shall be delineated, removed, and replaced in compliance with the specifications at no expense to the Owner.

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

A. Patching

1. As directed by the Owner or the Construction Manager, remove and replace all defective areas. Cut-out such areas and fill with fresh bituminous concrete. Compact to the required density.
2. CONTRACTOR shall restore all existing paved areas damaged by his operations in a manner acceptable to Owner or CM.

B. Cleaning and Protection

1. Cleaning: After completion of paving operations, clean surfaces of excess or spilled bituminous materials and all foreign matter. Sweep the surface with power broom or hand broom to remove loose material.

2. Protect newly finished pavement until it has become properly hardened by cooling.
3. Cover openings of drainage structures in the area of paving until permanent coverings are placed.
4. Protect existing surfaces of roads, parking lots, and seeded areas adjacent to job site and repair all damaged areas at no additional expense to company.

PART 4 SCHEDULES – NOT USED

END OF SECTION

PAVEMENT MARKINGS 32 17 23

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Install pavement markings on roads, driveways, and parking areas as called for in these specifications or as indicated on drawings.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES – NOT USED

1.03 SUBMITTALS

- A. PRODUCT DATA: Submit color sample of material that complies with, or exceeds, the requirements herein.

1.04 QUALITY ASSURANCE – NOT USED

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

A. PAINT

- 1. The paint shall be a non-bleeding, quick-drying, acrylic water based or VOC compliant solvent based paint suitable for traffic-bearing surfaces and shall meet Federal Specification TT-P-1952. Paint shall be mixed in accordance with manufacturer's instructions before application.

2.02 FINISHES – NOT USED

2.03 ACCESSORIES

A. HANDICAPPED PARKING STENCILS

- 1. The handicapped parking symbol shall be painted by use of a two-piece stencil, to provide a blue square background and white handicap symbol and stripe. Stencil to be 1/16" thick polyethylene non-porous plastic, 48" wide x 48" high, handicap symbol is 30" high x 27" wide, blue square is area is 38" wide x 38" high. Provide stencil by Alphabet Signs or approved equivalent.

2.04 FABRICATION – NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements
- B. Review of Existing Conditions
 - 1. Verify substrate has been inspected, gradients and elevations are correct, and substrate is dry.

3.02 DELIVERY, STORAGE AND HANDLING –

- A. Store in strict accordance with manufactures requirements.

3.03 PREPARATION

- A. Allow new pavement surfaces to cure for a period of not less than 14 days before application of marking materials.
- B. Remove any conflicting existing pavement markings by sandblasting, grinding, burning or other methods approved by the engineer.
- C. Thoroughly clean pavement surfaces of dirt, sand, gravel, dust, oil, grease and other foreign matter.
- D. Establish layout markings to guide paint application.

3.04 CONSTRUCTION

A. APPLICATION

- 1. Apply two coats of paint at manufacturer recommended rate without the addition of thinner, with a maximum of 100 square feet per gallon. Apply with mechanical equipment to produce true, sharp edges.
- 2. Allow the first coat of paint to dry in accordance with manufacturer's data on drying time before applying the second coat.
- 3. Apply word, arrow or symbol markings using a suitable template that will provide a pavement marking with true, sharp edges and ends.
- 4. Apply markings within a tolerance of plus or minus 1/8 inch in line width and a tolerance of plus or minus 3 inches in length or position.
- 5. Remove any incorrect markings by sandblasting, grinding, burning or other methods approved by the engineer.
- 6. The following items are to be painted with the colors noted below unless otherwise noted on the plans:
 - a. Pedestrian Crosswalks: White
 - b. Fire Lanes: Red or per local code
 - c. Lane Striping: White
 - d. Handicap Symbols: White and Blue
 - e. Parking Stall Striping: White, unless otherwise noted on plans
- 7. Protect finished markings from vehicles and pedestrian traffic until the paint is fully dried and ready for traffic.

B. INSTALLATION

- 1. Maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize flagmen, barricades, warning signs and warning lights as required.

2. Apply marking paint in dry weather when the pavement and atmospheric temperatures are 50 degrees (F) or above and anticipated to remain above 50 degrees for at least four hours after completing application.

3.05 FIELD QUALITY CONTROL

- A. Present for approval by the Owner's Representative a minimum Ten-foot stripe. Locate in a remote area.

PART 4

SCHEDULES – NOT USED

END OF SECTION

NON-SECURITY FENCES AND GATES 32 31 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: extent of chain link fences and gates is indicated on drawings. Non-security generally comprises the 8-foot-high fence and the manual swing gate associated with this fence.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. ASTM A53 / A53M "Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless"
- B. ASTM A123 / A123M "Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products"
- C. ASTM A153 / A153M "Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware"
- D. ASTM A392 "Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric"
- E. ASTM C33 / C33M "Standard Specification for Concrete Aggregates"
- F. ASTM C150 / C150M "Standard Specification for Portland Cement"

1.03 SUBMITTALS

- A. PRODUCT DATA Submit manufacturer's technical data, and installation instructions for metal fencing, fabric, gates and accessories.
- B. SHOP DRAWINGS: Submit section and details of fencing to Architect-Engineer for review prior to installation.

1.04 QUALITY ASSURANCE

- A. PROVIDE chain link fences and gates as complete units controlled by a single source including necessary erection accessories, fittings, and fastenings.

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS

A. GALVANIZED STEEL FENCING AND FABRIC:

- 1. Fencing and Fabric No. 9 ga. (0.148" \pm 0.005") size steel wires, 2" mesh, with top selvages knuckled for fabric 60" high and under, and both top and bottom selvages twisted and barbed for fabric over 60" high.
 - a. Furnish one-piece fabric widths for fencing up to 8'-0" high.
 - b. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:
 - i) Atkore Allied Tube & Conduit Corp., <http://www.atkore.com>
 - ii) American Fence Corp., <https://www.americanfence.com>
 - iii) Anchor Fence, Inc., <https://www.anchorfenceonline.com>

B. CANTILEVER SLIDE GATE SYSTEM MANUFACTURERS:

- 1. MANUFACTURERS: Subject to compliance with requirements, provide products of one of the following or acceptable equivalent:

- a. Tymetal Corporation, <https://www.tymetal.com/>
- b. HySecurity Gate Operators, <https://hysecurity.com/>
- 2. Gate manufacturer shall provide independent certification as to the use of a documented Welding Procedure Specification and Procedure Qualification Record to insure conformance to the AWS D1.2 welding code. Upon request, Individual Certificates of Welder Qualification documenting successful completion of the requirements of the AWS D1.2 code shall also be provided.
- 3. Gate manufacturer shall certify gate is manufactured in compliance with ASTM F 2200, Standard Specification for Automated Vehicular Gate Construction and the operators are UL 325 compliant.

2.02 FINISH: Galvanized, ASTM A392, Class II, with not less than 2.0 oz. zinc per sq. ft. of surface.

2.03 ACCESSORIES

- A. STEEL FRAMEWORK, GENERAL: Galvanized steel, ASTM A53 / A53M, with not less than 1.8 oz. zinc per sq. ft. of surface.
- B. FITTINGS AND ACCESSORIES: Galvanized, ASTM A153 / A153M, with zinc weights per Table I.
- C. END, CORNER AND PULL POSTS: Minimum sizes and weights as follows:
 - 1. CORNER POSTS:
 - a. 6'-0" TO 7'-0" FABRIC HEIGHT, 2-7/8" OD steel pipe, 3.65 lbs. per lin. ft., or 3.5" x 3.5" roll-formed sections, 4.85 lbs. per lin. ft.
 - b. 8'-0" TO 10'-0" FABRIC HEIGHT, 4" OD steel pipe, 5.79 lbs. per lin. ft., or 3.5" x 3.5" roll-formed sections, 4.85 lbs. per lin. ft.
 - 2. LINE POSTS: Space 10'-0" o.c. maximum, unless otherwise indicated, of following minimum sizes and weights.
 - a. 6'-0" TO 7'-0" FABRIC HEIGHT, 2-3/8" OD steel pipe, 3.65 lbs. per lin. ft. or 1.875" x 1.625" C-sections, 2.28 lbs. per lin. ft.
 - b. 8'-0" TO 10'-0" FABRIC HEIGHT, 2-7/8" OD steel pipe, 5.79 lbs. per lin. ft. or 2.25" x 1.875" H-sections, 2.64 lbs. per lin. ft.
- D. GATE POSTS: Furnish posts for supporting single gate leaf, or one leaf of a double gate installation, for nominal gate widths as follows:

LEAF WIDTH	GATE POST	LBS./LIN. FT.
Up to 6'-0"	3.5" x 3.5" roll-formed section	4.85
	or 2.875" OD pipe	5.79
Over 6'-0" to 13'-0"	4.000" OD pipe	9.11
Over 13'-0" to 18'-0"	6.625" OD pipe	18.97
Over 18'-0"	8.625" OD pipe	28.55

- E. TENSION WIRE: 7-gauge, coated coil spring wire, metal, and finish to match fabric.
 - 1. Locate at bottom of fabric.
- F. POST BRACE ASSEMBLY: Manufacturer's standard adjustable brace at end and gate posts and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric. Use same material as top rail for brace, and truss to line posts with 0.375" diameter rod and adjustable tightener.
- G. STRETCHER BARS: One-piece lengths equal to full height of fabric, with minimum cross-section of 3/16" x 3/4". Provide one stretcher bar for each gate and end post, and 2 for each corner and pull post, except where fabric is integrally woven into post.
- H. STRETCHER BAR BANDS: Space not over 15" o.c., to secure stretcher bars to end, corner, pull, and gate posts.

- I. BARBED WIRE SUPPORTING ARMS: Manufacturer's standard barbed wire supporting arms, metal and finish to match fence framework, with provision for anchorage to posts and attaching 3 rows of barbed wire to each arm. Supporting arms may be either attached to posts or integral with post top weather cap and must be capable of withstanding 250 lbs. downward pull at outermost end. Provide following type:
 - 1. SINGLE 45° ARM; for 3 strands barbed wire, one for each post.
- J. BARBED WIRE: 2 strands, 12-1/2 ga. wire with 14 ga. 4-point barbs spaced not more than 5" o.c.; metal and finish to match fabric.
- K. GATES:
 - 1. FABRICATION: Fabricate perimeter frames of gates from metal and finish to match fence framework. Assemble gate frames by welding or with special fittings and rivets for rigid connections, providing security against removal or breakage connections. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware, and accessories. Space frame member's maximum of 8'-0" apart unless otherwise indicated.
 - a. Provide the same fabric as for the fence, unless otherwise indicated. Install fabric with stretcher bars at vertical edges and at top and bottom edges. Attach stretcher bars to gate frame at not more than 15" o.c.
 - b. Install diagonal cross-bracing consisting of 3/8" diameter adjustable length truss rods on gates to ensure frame rigidity without sag or twist.
 - c. Where barbed wire is indicated above gates, extend end members of gate frames 1'-0" above to member and prepare to receive 3 strands of wire. Provide necessary clips for securing wire to extensions.
- L. SWING GATES: Fabricate perimeter frames of minimum 1.90" OD pipe.
- M. GATE HARDWARE: Provide hardware and accessories for each gate, galvanized per ASTM A153 / A153M, and in accordance with the following:
 - 1. HINGES: Size and material to suit gate size, non-lift-off type, offset to permit 180° gate opening. Provide 1-1/2 pair of hinges for each leaf over 6'-0" nominal height.
 - 2. LATCH: Forked type or plunger-bar type to permit operation from either side of gate, with padlock eye as integral part of latch.
 - 3. KEEPER: Provide keeper for vehicle gates, which automatically engages gate leaf and holds it in open position until manually released.
 - 4. DOUBLE GATES: Provide gate stops for double gates, consisting of mushroom type flush plate with anchors, set in concrete, and designed to engage center drop rod or plunger bar. Include locking device and padlock eyes as integral part of latch, permitting both gate leaves to be locked with single padlock.
- N. CONCRETE: Provide concrete consisting of portland cement, ASTM C150 / C150M, aggregates, ASTM C33, and clean water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 3000 psi using at least 480#/CY cement, 1" maximum size aggregate, maximum 3" slump, and 2% to 4% entrained air.

PART 3 EXECUTION

- 3.01 EXAMINATION OF SITE
 - A. REFER TO DIVISION 1 for General Requirements
 - B. DO NOT BEGIN installation and erection before final grading is completed, unless otherwise permitted.
- 3.02 DELIVERY, STORAGE AND HANDLING: do not have materials delivered until coordinated with other trades.
- 3.03 PREPARATION: do not begin installation and erection before final grading is completed, unless otherwise permitted.

3.04 CONSTRUCTION

- A. SETTING POSTS: Center and align posts in holes 3" above bottom of excavation.
 - 1. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment and hold in position during placement and finishing operations.
 - a. Unless otherwise indicated, extend concrete footings 2" above grade and trowel to crown to shed water.
 - 2. Drill or hand excavate (using post hole digger) holes for posts to diameters and spacings shown, in firm, undisturbed or compacted soil.
 - a. If not indicated in drawings, excavate holes for each post to minimum diameters as recommended by fence manufacturer, but not less than 4 times largest cross-section of post.
 - b. Unless otherwise indicated, excavate hole depths approximately 3" lower than post bottom, with bottom of posts set not less than 36" below finish grade surface.
- B. TOP RAILS: Provide top rails where indicated. Install one piece between posts and flush with post on fabric side, using special offset fittings where necessary.
- C. BRACE ASSEMBLIES: Install braces so posts are plumb when diagonal rod is under proper tension.
- D. TENSION WIRE: Install tension wires through post cap loops before stretching fabric. Fasten fabric to tension wire using 11 ga. galvanized steel hog rings spaced 24" o.c.
- E. FABRIC: Leave approximately 2" between finish grade and bottom selvage, unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on the security side of fence, and anchor to framework so that fabric remains in tension after pulling force is released.
- F. STRETCHER BARS: Thread through or clamp to fabric 4" o.c., and secure to posts with metal bands spaced 15" o.c.
- G. BARBED WIRE: Pull wire taut and install securely to extension arms and secure to end post or terminal arms in accordance with manufacturer's instructions.
- H. GATES: Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.
- I. TIE WIRES: Use U-shaped wire, conforming to diameter of pipe to which attached, clasping pipe and fabric firmly with ends twisted at least 2 full turns. Bend ends of wire to minimize hazard to persons or clothing.
 - 1. Tie fabric to line posts, with wire ties spaced 12" o.c. Tie fabric to rails and braces, with wire ties spaced 24" o.c. Tie fabric to tension wires, with hog rings spaced 24" o.c.
- J. FASTENERS: Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

PART 4 SCHEDULES – NOT USED

END OF SECTION

SEEDING 32 92 19

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Provide seeded lawns as shown and specified. The work includes soil testing and preparation, seeding lawns and other indicated areas and maintenance until Substantial Completion and thereafter as specified.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

REFERENCES – NOT USED

1.02 SUBMITTALS

A. PRODUCT DATA

- 1. Submit seed vendor's certification for required grass seed mixture, indicating percentage by weight, and percentages of purity, germination, and weed seed for each grass species.
- 2. Submit soil test report indicating available nutrients in soil and laboratory recommendations for soil amendments, including application rates and formulas for limestone and fertilizer. Application rates and formulas shall be appropriate to actual time of seeding.
- 3. Submit vendor's certification for analysis of all fertilizer.

B. SHOP DRAWINGS – NOT USED

- C. WARRANTY: Provide a uniform stand of grass (no bare or thin spots) by watering, mowing, and maintaining seeded areas until Substantial Completion and subsequently, until the end of the Contractor's required maintenance period. Reseed areas, with specified materials, which fail to provide a uniform stand of grass until all affected areas area accepted by the Architect/Engineer.

1.03 QUALITY ASSURANCE – NOT USED

1.04 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.05 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

PART 2 PRODUCTS

2.01 MATERIALS / EQUIPMENT

- A. Mechanical seeder: John Deere "Power-Till", or equal.
- B. Lawn seed: Fresh, clean, and new crop seed mixture.
 - 1. Mixed by an approved method.
 - 2. The following seed varieties shall be used as indicated on the Drawings and according to time of seeding:
 - a. Common Hulled Bermuda Grass: 95% Purity, 90% Minimum Germination
 - b. Annual Winter Ryegrass (temporary cover): 98% Purity, 90% Minimum Germination
- C. Topsoil for Lawn Areas: Fertile, friable, natural topsoil of loamy character, without admixture of subsoil material, obtained from a well-drained arable site, reasonably free from clay,

lumps, coarse sands, stones, plants, roots, sticks, and other foreign materials, with acidity range of between pH 6.0 ad 6.8.

1. Identify source location of topsoil proposed for use on the project.
 2. Topsoil which exists on the project site, including that which has been stripped and stockpiled during construction, will be acceptable if it meets the requirements of this specification, and if approved by Architect/Engineer.
 3. Provide topsoil free of substances harmful to the plants which will be grown in the soil.
- D. Fertilizer: Granular, non-burning product composed of not less than 50% organic slow acting, guaranteed analysis professional fertilizer.
1. Type A: Starter Fertilizer, formula in accordance with approved laboratory soil test report(s) and time of application.
 2. Type B: Top Dressing Fertilizer, formula in accordance with approved laboratory soil test report(s) and time of application.
- E. Ground limestone: containing not less than 85% of total carbonates and ground to such fineness that 50% will pass through a 100-mesh sieve and 90% will pass through a 20-mesh sieve.
- F. Straw mulch: Fresh straw mulch of consistent size and quality, for distribution over seeded areas.
- G. Water: Free of substances harmful to seed growth. Hoses or methods of transportation furnished by Contractor.

2.02 FINISHES – NOT USED

2.03 ACCESSORIES – NOT USED

2.04 FABRICATION – NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements
- B. Work notification: Notify Architect/Engineer at least 7 working days prior to start of seeding operation.
- C. Protect existing grades, utilities, paving and other facilities from damage caused by seeding operations.
- D. Perform seeding work only after planting and other work affecting ground surface has been completed.
- E. Restrict traffic from lawn areas until grass is established. Erect signs and barriers as required.
- F. Provide hose and lawn watering equipment, including water, as required.
- G. Examine finish surfaces, grades, topsoil quality, and depth. Do not start seeding work until unsatisfactory conditions are corrected.

3.02 DELIVERY, STORAGE AND HANDLING

- A. Deliver seed and fertilizer materials in original unopened containers, showing weight, analysis, and name of manufacturer. Store in manner to prevent wetting and deterioration.

3.03 PREPARATION

- A. SURFACE PREPARATIONS: Limit preparation to areas which will be immediately seeded.

B. Topsoil:

1. Add topsoil sufficient to establish 4" minimum depth of topsoil cover. Loosen topsoil of lawn areas to minimum of 4". Remove stones over 1" in any dimension, sticks, roots, rubbish, and extraneous matter.
2. Note that the use of existing, in-place topsoil for seeding operations will require the approval of Architect/Engineer in advance and will depend in part on soil test report(s).

C. Grade lawn areas to a smooth, free draining even surfaces with a loose, moderately coarse texture. Roll and rake, remove ridges, and fill depressions as required to drain.

D. Apply limestone at recommended rate in soil test report. Ensure that pH of topsoil is not less than 6.0 nor more than 6.8. Distribute evenly by machine and incorporate thoroughly into topsoil.

E. Distribute Type A fertilizer at recommended rate in soil test report.

1. Apply fertilizer by mechanical rotary or drop type distributor, thoroughly and evenly incorporated with soil to a depth of 3" by disking or other approved method. Fertilize areas inaccessible to power equipment with hand tools and incorporate into soil.

F. Restore prepared areas to specified condition if eroded, settled, or otherwise disturbed after fine grading and prior to seeding.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION: Seeding

1. Apply Common Hulled Bermuda Grass in areas indicated on Drawings at rate of 45 pounds per acre between May 15 and September 15. Contractors shall make every effort to schedule and complete work so that seeding occurs in this period.
 - a. If the above seeding time is not possible; apply Annual Winter Ryegrass at rate of 160 pounds per acre. Annual Winter Ryegrass will serve as temporary winter cover, install permanent Bermuda Grass seed after completely removing all Ryegrass from the site by an approved chemical/mechanical method.
2. Seed immediately after preparing of bed.
3. Seed indicated areas within contract limits and areas adjoining contract limits disturbed as a result of construction operations.
4. Perform seeding operation when the soil is dry and when winds do not exceed 5 miles per hour velocity.
5. Apply seed with equipment specified herein. Install seed evenly by sowing equal quantities in 2 directions, at right angles to each other (as approved by Architect/Engineer).
6. Apply straw mulch evenly over seeded area, with an average mulch thickness of ½".

B. COORDINATION WITH OTHER WORK – NOT USED

3.05 FIELD QUALITY CONTROL – NOT USED

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK

A. CLEANING: Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, debris, and equipment. Repair damage resulting from seedling operations.

B. MAINTENANCE:

1. Maintain seeded lawns until Substantial Completion, and for a period of at least 30 days after Substantial completion and thereafter until acceptance of seeding operations.

2. Maintain seeded lawn areas, including watering, spot weeding, mowing, applications of herbicides, fungicides, insecticides, and reseeding until a full, uniform stand of grass free of weeds, undesirable grass species, disease, and insects is achieved and accepted by the Architect/Engineer.
 - a. Water daily or as needed to maintain adequate surface soil moisture for proper seed germination. Thereafter apply ½" of water twice weekly until acceptance. Watering may be waived if equivalent rainfall occurs within any weekly watering period.
 - b. Repair, rework, and reseed all areas that have washed out, are eroded, or do not catch.
 - c. Mow lawn areas as soon as lawn top growth reaches a 3" height. Cut back to 2" in height. Repeat mowing as required to maintain 2" height.
 - d. Apply Type B fertilizer to lawns approximately 30 days after seeding at recommended rate in soil test report. Apply with mechanical rotary or drop distributor. Thoroughly water into soil.
- 3.07 ACCEPTANCE/SUBSTANTIAL COMPLETION
- A. Inspection to determine acceptance of seeded lawns will be made by the Architect/Engineer, at the time of Substantial Completion for the entire project. The Contractor shall provide notification at least 10 working days before the requested inspection date.
 1. Seeded areas will be acceptable provided all requirements, including maintenance, have been compiled with, and a healthy uniform, close stand of the specified grass is established free of weeds, undesirable grass species, disease, and insects.
 2. No individual lawn area shall have bare spots or unacceptable cover totaling more than 2% of the individual areas, in areas requested to be inspected.
 - B. Upon Substantial Completion and acceptance of lawn areas, and at the end of the Contractor's maintenance period, the Owner will assume lawn maintenance.

PART 4 SCHEDULES – NOT USED

END OF SECTION

DIVISION - 33 UTILITIES

33 11 00 WATER DISTRIBUTION SYSTEMS

33 39 00 SEWER STRUCTURES

33 40 00 STORM SEWER SYSTEMS

WATER DISTRIBUTION SYSTEMS 33 11 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Furnish labor, materials, services, equipment, and other necessary items required for the construction of the water systems. This shall include, but not be limited to the following: pipe and fittings for site water line including domestic water line and fire water line, valves and fire hydrants. Set lines, elevations, and grades for water distribution systems work and control system for duration of work. Including careful maintenance of benchmarks, property corners, monuments, or other reference points.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. AASHTO T180—Moisture-Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and an 18-in. (457 mm) Drop
- B. ANSI/ASME B16.18—Cast Copper Alloy Solder Joint Pressure Fittings
- C. ANSI/ASME B16.22—Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
- D. ANSI/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
- E. ANSI/ASTM D2466—Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
- F. ANSI/AWS A5.8—Brazing Filler Metal
- G. ANSI/AWWA C104—Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
- H. ANSI/AWWA C105—Polyethylene Encasement for Ductile Iron Piping for Water and Other liquids
- I. ANSI/AWWA C111—Rubber-Gasket Joints for Ductile Iron and Grey-Iron Pressure Pipe and Fittings
- J. ANSI/AWWA C151—Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids
- K. ANSI/AWWA C500—Gate Valves, 3 through 48 in NPS, for Water and Sewage Systems
- L. ANSI/AWWA C502—Dry Barrel Fire Hydrants
- M. ANSI/AWWA C504—Rubber Seated Butterfly Valves
- N. ANSI/AWWA C508—Swing-Check Valves for Waterworks Service, 2 in through 24 in NPS
- O. ANSI/AWWA C509—Resilient Seated Gate Valves 3 in through 12 in NPS, for Water and Sewage Systems
- P. ANSI/AWWA C600—Installation of Ductile-Iron Water Mains and Appurtenances
- Q. ANSI/AWWA C606—Grooved and Shouldered Type Joints.
- R. ANSI/AWWA C651 – Disinfecting Water Mains
- S. ANSI/AWWA C900—Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 inch through 12 inch, for Water
- T. ASTM B88—Seamless Copper Water Tube
- U. ASTM D1785—Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
- V. ASTM D2241—Poly (Vinyl Chloride) (PVC) Plastic Pipe(SDR-PR)
- W. ASTM D2855—Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings
- X. ASTM D2922—Test Methods for Density of Soil and Soil- Aggregate in Place by Nuclear Methods (Shallow Depth)
- Y. ASTM D3017—Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures
- Z. ASTM D3139—Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals

- AA. ASTM D3035—Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter
- BB. AWWA C901—Polyethylene (PE) Pressure Pipe, Tubing, and Fittings, 1/2 inch through 3 inch, for water.
- CC. UL 246—Hydrants for Fire-Protection Service

1.03 SUBMITTALS

- A. PRODUCT DATA: Provide data on pipe materials, pipe fittings, hydrants, valves and accessories.
- B. MANUFACTURER'S CERTIFICATE: Certify that products meet or exceed state or local requirements.

1.04 QUALITY ASSURANCE

A. QUALIFICATIONS

- 1. Perform work in accordance with utility company and/or municipality requirements.
- 2. Valves: Manufacturer's name and pressure rating marked on valve body.

1.05 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

A. Project Record Documents

- 1. Accurately record actual locations of piping mains, valves, connections, and invert elevations.
- 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

PART 2 PRODUCTS

2.01 MATERIALS

A. PIPE

- 1. Pipe sizes less than 3" that are installed below grade and outside building shall comply with one or combination of following:
 - a. Type K Copper roll, hard or soft-drawn to comply with ASTM B 88-62. All piping 2" and smaller shall be looped with soft copper with no joints beneath slab. All piping larger than 2" shall have SIL-FOS brazed joints.
 - b. Polyvinyl Chloride Water Pipe: Pipe Shall Conform to ASTM D-2241 with an SDR 21 rating and shall be continually marked with manufacturer's name, pipe size, cell classification, SDR rating, ASTM D 1784 classification, National Sanitation Foundation Seal (Potable Water Only). Pipe joints shall be integrally molded bell ends in accordance with ASTM D 3139 with factory supplied elastomeric gaskets and lubricant.
- 2. Pipe sizes 3" and larger that are installed below grade and outside building shall comply with one of the following:
 - a. Ductile Iron Water Pipe: Mechanical joint ductile iron pipe in accordance with AWWA C151 (CLASS 50) with cement lining in accordance with AWWA C104.
 - b. Polyvinyl Chloride (PVC) Water Pipe (4" thru 12"): Pipe shall meet the requirements of AWWA C900 (Class 150). Pipe shall be continually marked as for smaller pipes. Pipe joints shall be integrally molded bell ends with factory-supplied elastomeric gaskets and lubricant.
 - c. Polyvinyl Chloride (PVC) Water Pipe (14" thru 36"): Pipe shall meet the requirements of

AWWA C905, pressure rating 235.). Pipe shall be continually marked as for smaller pipes. Pipe joints shall be integrally molded bell ends with factory-supplied elastomeric gaskets and lubricant.

B. FITTINGS

1. Fittings for pipes smaller than 4" shall comply with one of the following:
 - a. Seamless Copper Tubing: Wrought copper (95-5 Tin Antimony solder joint) fittings in accordance with ASTM B16.22.
 - b. Polyvinyl Chloride Water Pipe: Bell and Spigot Type Polyvinyl Chloride fittings of the same schedule and/or pressure rating as the accompanying pipe.
2. Fittings for pipes 4" and larger that are installed below grade and outside building shall be ductile iron fittings in accordance with AWWA C110 with cement lining in accordance with AWWA C104. Fittings shall be mechanical joint ends unless otherwise called for in the plans.

C. VALVES

1. General:
 - a. Manual Operators: Provide manual operators for all valves. Unless otherwise specified, provide each manual operator with a wrench nut.
 - b. Wrench Nuts: Provide wrench nuts which comply with Section 4.11 of ANSI/AWWA C509. Furnish not less than two operating keys for operation of the wrench nut operated valves.
 - c. Rotation: The direction of rotation of the wheel, wrench nut, or lever to open the valve shall be to the left (counterclockwise). Each valve body or operator shall have cast thereon the word "OPEN" and an arrow indicating the direction to open.
 - d. Length Tolerance: Actual length of valves shall be within 1/16 inch (plus or minus) of the specified or theoretical length.
 - e. Ends: Restrained mechanical joint ends conforming to ANSI/AWWA C111/A21.22 unless otherwise specified.
2. Gate Valves – 2 inches and larger
 - a. Valves shall have mechanical joint ends. Valves shall have a clear waterway equal to the full nominal diameter of the valve and shall be opened by turning counterclockwise. Operating nut or wheel shall have an arrow cast in the metal indicating the direction of opening. Valves smaller than 3 inches shall be all bronze and shall conform to MSS SP-80, Type I. Valves 3 inches and larger shall be iron-body, brass-mounted, conforming to AWWA C500.
 - b. Gate valves 12" and smaller shall be designed for 200 psi working pressure. Gate valves larger than 12" shall be designed for 150 psi working pressure.
3. Ball Valves — up to 2 Inches: Brass body, Teflon coated brass ball, rubber seats and stem seals, Tee stem pre-drilled for control rod, AWWA compression inlet end, compression outlet with electrical ground connector, with control rod, extension box and valve key.
4. Butterfly Valves — from 2 Inches to 24 Inches: Butterfly valves shall meet or exceed ANSI/AWWA C504. Valves shall be iron body with bronze disc, resilient replaceable seat, mechanical joint ends and infinite position lever handle.
5. Check Valves
 - a. Check valves shall be iron body, bronze mounted, full opening swing type. Valve clapper shall swing completely clear of the waterway when the valve is fully open. Check valves shall meet or exceed AWWA C-508.
 - b. End connections: 125# ANSI flanged ends.

- 6. Post-Indicator Valves
 - a. Assembly shall consist of a standard FM-approved or UL-listed inside-screw gate valve with an above-grade post indicator. Direction to open shall be counterclockwise.
 - b. Surfaces below grade shall receive a coating of bitumen not less than 20 mils thick. Above-grade surfaces shall be filled, primed, and finished with a multiple coat of high-gloss, weather-resistant, red enamel.
 - c. Post indicator valves shall be fitted to accommodate electrical supervisory switches.
- D. VALVE BOXES: Valve boxes shall be cast iron, complete with lock-type covers requiring a special wrench for removal. Cast-iron boxes shall be the extension type with screw or slide adjustments and with flared bases. Concrete boxes shall only be permitted if specifically called for in the plans and shall be constructed in accordance with the details indicated. The word "WATER" shall be cast in the cover. Boxes shall be installed over each gate valve. Boxes shall be of such a length as can be adapted, without full extension, to the depth of cover required over the pipe at the valve location.
- E. Fire Hydrants: Fire hydrants shall be in accordance with AWWA C502, for dry-barrel type fire hydrant. Hydrants shall have a 6-inch bell connection, two 2-1/2-inch hose connections, and one 4-1/2-inch pumper connection unless otherwise required by local utility company or fire department. Outlets shall have American National fire-hose coupling threads unless otherwise required by local utility company or fire department. The working parts shall be bronze. Hydrants shall be connected to the mains with 6-inch diameter pipes. Hydrants shall be painted with one coat of zinc-chromate alkyd paint primer and two finish coats of approved paint of the color required by the local utility company or fire department.
- F. Ground Mounted Fire Department Connections
 - 1. Hose connections shall have National Firehose standard-thread form and rocker lugs in accordance with NFPA 1963. Hose-connection sizes and threads shall be compatible with the equipment used by the fire department serving the facility.
 - 2. Unit shall be cast brass or bronze, with two 2-1/2-inch, fire-department, swivel, female inlets; double-clapper valves; rocker-lug caps and chains; and cast-in function-identifying lettering. Finish shall be chrome-plated or polished surface. Chrome plate shall be in accordance with ANSI A112.18.1M.
 - 3. Unit shall be mounted on a Schedule 40 ASTM A 53/A 53M galvanized carbon-steel pipe with red-enameled finish on prime-coated surface. All surfaces embedded in concrete or below grade shall be protected with a 20-mil thick bituminous coating.

2.02 FINISHES – NOT USED

2.03 ACCESSORIES

- A. Concrete for Thrust Blocks: Place thrust blocking consisting of 3,000 psi concrete to provide sufficient bearing area to transmit unbalanced thrust from bends, tees, caps, or plugs to undisturbed soil without loading undisturbed soil in excess of 2,500 lbs/sq ft when water main pressure is 100 psi. The following bearing areas shall be provided unless greater areas are called for in the plans. If undisturbed soils are of a nature that will not provide a bearing capacity of 2.500 psf, notify the engineer so that appropriate adjustments can be made.

MINIMUM THRUST BLOCKING BEARING AREAS				
Pipe Diameter	Tees Sq.Ft.	90° Bend Sq.Ft.	45° Bend Sq.Ft.	22° Bend Sq.Ft.
4"	1.0	1.0	1.0	1.0

6"	1.5	2.0	1.0	1.0
8"	2.5	3.5	1.8	1.0
10"	4.0	5.5	2.8	1.5
12"	6.0	8.0	4.0	2.0
14"	8.0	11.0	5.5	3.0
16"	10.0	14.2	7.0	4.0

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements
- B. Review of Existing Conditions
 - 1. Verify existing conditions.
 - 2. Verify that building service connection and municipal utility water main size, location and invert are as indicated.

3.02 DELIVERY, STORAGE AND HANDLING

- A. Pipe Handling: Pipe and accessories shall be handled in a manner to ensure delivery to the trench in an undamaged condition. Particular care shall be taken not to injure the pipe coating. When the coating or lining of any pipe or fitting is damaged, the repair shall be made by the Contractor at his expense in an approved manner. No other pipe or material shall be placed inside of a pipe or fitting after the coating has been applied. Pipe shall be carried into position. Use of pinch bars and tongs for aligning or turning the pipe shall be permitted only on the bare ends of the pipe. The interior of pipe and accessories shall be cleaned before being lowered into the trench and shall be kept clean during laying operations by an approved method. Before installation, the pipe shall be inspected for defects. Material found to be defective before or after laying shall be replaced with sound material without additional cost to the Owner. Rubber Gaskets that are not to be installed immediately shall be stored in a cool dark place out of the direct rays of the sun.

3.03 PREPARATION

- A. JOB CONDITIONS – NOT USED
- B. SURFACE PREPARATIONS
 - 1. PIPING
 - a. Ream pipe and tube ends and remove burrs.
 - b. Remove scale and dirt, on inside and outside, before assembly.
 - c. Prepare pipe connections to equipment with flanges or unions.
 - 2. Bedding
 - a. Excavate pipe trench in accordance with Section 31 23 00 for work of this Section. Hand-trim excavation for accurate placement of pipe to elevations indicated.
 - b. Place bedding material at trench bottom, level fill materials in one continuous layer not

exceeding 8 inches compacted depth, compact to 98%.

- c. Backfill around sides and to top of pipe with fill, tamped in place and compacted to 98%.
- d. Maintain optimum moisture content of bedding material to attain required compaction density.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. Installation — Pipe

- a. Maintain separation of water main from sanitary and storm sewer piping in accordance with state or local code. Waterlines shall not be laid in the same trench with gas lines, fuel lines, or electrical wiring.
- b. Install pipe to indicated elevation to within tolerance of 1 inch.
- c. Install ductile iron piping and fittings to ANSI/AWWA C600.
- d. Cutting of pipe shall be done without damage to the pipe. Cutting shall be done with an approved mechanical cutter. Wheel cutters shall be used when practical.
- e. Route pipe in straight line. Maximum deflection in each joint will be in accordance with manufacturer's recommendations.
- f. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- g. Connections with Existing Pipelines: Where connections are made between new work and existing piping, make connection using suitable fittings for conditions encountered. Make each connection with existing pipe at time and under conditions which least interfere with operation of existing pipeline.
- h. Form and place concrete for thrust blocks at each elbow or change of direction of pipe main.
- i. Establish elevations of buried piping to ensure that the top of the pipe is not less than 6" below the frost line or 36" below finished grade, whichever is greater.
- j. If a non-metallic pipe is used, install detection tape or tracer wire above top of pipe.
- k. Backfill trench with native material.

2. Installation — Valves and Hydrants

- a. Install gate valves as indicated on Drawings and supported on concrete pads with valve stem vertical and plumb. Install valve boxes in a manner that will not transmit loads, stress, or shock to valve body. Center valve box over operating nut of valve vertical and plumb. Securely fit valve box together leaving cover flush with finished surface.
- b. Set hydrants plumb and locate pumper nozzle perpendicular to roadway.
- c. Install fire hydrant assemblies as indicated on Drawings in vertical and plum position with steamer nozzle pointed toward building unless otherwise directed by local authorities. Support hydrant assembly on concrete pad and firmly braced on side opposite inlet pipe against undisturbed soil and concrete blocking. Place a minimum of 6 cu. ft. of crushed stone or gravel around hydrant base and barrel after thrust blocking has cured at least 24 hours. Exercise care when backfilling and compacting so proper vertical position will not be altered.

3. Disinfection of Domestic Water Piping System

- a. Sterilize distribution system in accordance with the requirements of AWWA C 651. Open and close valves in lines being sterilized several times during contact period. After sterilization, take water and bacteriologically test in accordance with AWWA specifications. Do not place distribution system in service until approval is obtained from applicable governing authorities. Sampling shall be performed by a Certified Operator, or representative of local public water provider. If two consecutive negative samples are obtained, repeat the disinfection procedure until satisfactory results occur.

4. Service Connections

- a. Provide water service to utility company requirements with reduced pressure backflow preventer if required and water meter with by-pass valves and sand strainer.

3.05 Field Quality Control

- A. Test water distribution system pipe installed below grade and outside building in accordance with following procedures:
 1. Perform pressure and leakage tests in accordance with AWWA C 600 at a minimum of 150 psi or 1.5 times the working pressure, whichever is greater.
 2. Furnish, install, and operate the necessary connections, pump, meter, and gauges. Leakage shall not exceed that permitted by AWWA Specifications C600-64 for mechanical joint and push-on joint pipe. Prior to running any test, the meter shall be tested, sealed, and approved by applicable governing authority at Contractor's expense.
 3. Locate and repair all leaks and repeat tests until test results are satisfactory and in compliance with this section.
 4. Furnish copy of results of meter test and hydrostatic pressure test to Owner upon completion of water distribution backfilling operations.

PART 4 SCHEDULES – NOT USED

END OF SECTION

SANITARY SEWER SYSTEM 33 30 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION: Furnish labor, materials, services, equipment, and other necessary items required for the construction of the sanitary systems. This shall include, but not be limited to, the following: Sanitary sewer drainage piping, Fittings and Accessories, Cleanouts, and Bedding. Set lines, elevations, and grades for sanitary sewer system work and control system for duration of work. Including careful maintenance of benchmarks, property corners, monuments, or other reference points.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. ANSI/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
- B. ANSI/ASTM D3034—Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- C. ASTM D1785—Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120
- D. ASTM D2922—Test Methods for Density of Soil and Soil- Aggregate in Place by Nuclear Methods (Shallow Depth)
- E. ASTM D3017—Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures
- F. ASTM A746 – Ductile Iron Sanitary Sewer Pipe.

1.03 SUBMITTALS

- A. PRODUCT DATA: Provide catalog materials indicating pipe, pipe accessories, and fittings including manufacturer's installation instructions indicating special procedures required to install products specified.
- B. SHOP DRAWINGS - Drawings and data including but not be limited to, the following:
 - 1. Details of joints
 - 2. Gasket material
 - 3. Pipe length
- C. Manufacturer's Certificate: Certify that products meet or exceed ASTM designations.

1.04 QUALITY ASSURANCE – NOT USED

1.05 SYSTEM DESCRIPTION

- A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out

PART 2 PRODUCTS

2.01 MATERIALS

A. SEWER PIPE MATERIALS

1. Polyvinyl Chloride Sanitary Sewer
 - a. Pipe and fittings shall comply with ASTM D 3034, rated SDR 35. Pipe shall be continually marked with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM D 3034 classification.
 - b. Pipe joints shall be integrally molded bell ends per ASTM D 3034, Table 2, with factory supplied elastomeric gaskets and lubricant.
2. Ductile Iron Sanitary Sewer
 - a. Pipe shall conform to ASTM A746. Fittings shall conform to AWWA C110. Fittings shall have strength at least equivalent to that of the pipe. Ends of pipe and fittings shall be suitable for the joints specified hereinafter. Pipe and fittings shall have cement-mortar lining conforming to AWWA C104, standard thickness.
 - b. Pipe and fittings shall have push-on joints. Push-on joint pipe ends and fitting ends, gaskets, and lubricant for joint assembly shall conform to AWWA C111.

B. MANHOLES

1. Precast Concrete Manholes: ASTM C 478, precast reinforced concrete, designed for HS 20 loading per ASTM C890, of depth indicated with provision for rubber gasket joints.
 - a. Base Section: 6-inch minimum thickness for floor slab and 5-inch minimum thickness for walls and base riser section and having a separate base slab or base section with integral floor.
 - b. Riser Sections: 5-inch minimum thickness, diameter and lengths to provide dimensions as indicated.
 - c. Top Section: Eccentric cone type, unless flat-slab-top type is indicated. Top of cone to match grade rings.
 - d. Grade Rings: Provide 2 or 3 reinforced concrete rings, of 6-8-inch total thickness and match 24-inch diameter frame and cover.
 - e. Gaskets: ASTM C 443, rubber.
 - f. Steps: Cast into base, riser, and top sections sidewall at 12-16-inch intervals.
 - g. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.
 - h. Channel and Bench: Reinforced concrete.
 - i. Patch joints inside and outside with non-shrink grout.
 - j. After repairs to inside concrete surface, it should be coated with moisture/vapor penetration preventing the epoxy to fill and seal all voids and honeycombs.
 - k. Coat outside of manhole with Bitu-Mastic coating.
2. Cast-in-Place Manholes: Reinforced concrete of dimensions and with appurtenances indicated.
 - a. Bottom, Walls, and Top: Reinforced concrete in accordance with ACI 318 & 350.
 - b. Channel and Bench: Reinforced concrete.
 - c. Steps: Cast into sidewall at 12-16-inch intervals.
 - d. Patch joints inside and outside with non-shrink grout.
 - e. Coat inside of manhole with epoxy to fill and seal all voids and honeycombs.
 - f. Coat outside of manhole with Bitu-Mastic coating.
3. Manhole Steps: Steel - reinforced plastics, wide enough for an adult to place both feet on one step and designed to prevent lateral slippage off the step.
 - a. Steel Reinforcing Bar: ASTM A615, Grade 60, 1/2-inch diameter.
 - b. Plastic: ASTM D4101, copolymer polypropylene, 1/8-inch minimum thickness.

4. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, heavy-duty, traffic bearing, ductile iron, 24-inch clear opening by 7-9-inch riser with 4-inch minimum width flange, and 26 inch diameter cover, indented top design, with lettering "SANITARY SEWER" cast into cover.

2.02 FINISHES - NOT USED

2.03 ACCESSORIES

A. PIPE ACCESSORIES

1. Pipe Joints: Mechanical clamp ring type, stainless steel expanding and contracting sleeve, neoprene ribbed gasket for positive seal.
2. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

B. CLEANOUTS

1. Lid and Frame: Heavy Duty cast iron construction, manufactured by Mueller: Lid Design: Closed Lid.
2. Shaft Construction: Cast Iron shaft of internal diameter as specified on plans with 3000 psi concrete collar for cleanouts located in paved areas.
3. Base Pad: Cast-in-place concrete, 3000 psi leveled top surface to receive cast iron shaft sections, sleeved to receive sanitary sewer pipe sections.

2.04 FABRICATION – NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements

3.02 DELIVERY, STORAGE AND HANDLING

A. GENERAL

1. In strict accordance with manufacture and industry standards.

B. DUCTILE IRON or POLYVINYL CHLORIDE (PVC) SEWER PIPE

1. Packing. Factory packed units.
2. Receiving. Inspect each shipment. Note damaged or missing items.
3. Unloading. Unload package units with mechanical equipment. During removal ensure units do not strike anything.
4. Storage. Store package units in level area without stacking. Keep interior and all sealing surfaces of pipe, fittings and appurtenances free of dirt and foreign matter. Protect gaskets from direct sunlight, oil and grease.
5. Handling. Avoid severe impact, abrasion, gouging or cutting by metal surfaces or rocks. String pipe on opposite side of trench from excavating material. Do not drop pipe into trench directly from truck.

3.03 PREPARATION

- A. Verify locations and elevations of connections to existing sanitary sewer system. Verify locations and elevations of other existing utilities or other obstructions to avoid conflict with sanitary sewer lines.
- B. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.
- C. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.
- D. Swab the interior of the pipe to remove all undesirable material.
- E. Prepare the bell end and remove undesirable material from the gasket and gasket recess.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. Bedding

- a. Excavate pipe trench in accordance with Section 31 23 00 for work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.
- b. Place bedding material at trench bottom, level materials in continuous layer not exceeding 8 inches compacted depth, compact to 98 percent.
- c. Maintain optimum moisture content of bedding material to attain required compaction density.

2. Installation - Pipe

- a. Install pipe, fittings, and accessories in accordance with ASTM C12, ASTM C14 and/or manufacturer's instructions. Seal joints watertight.
- b. Lay pipe to slope gradients noted on civil engineering drawings; with maximum variation from true slope of 1/8 inch in 10 feet.
- c. Install bedding at sides and over top of pipe to minimum compacted thickness of 12 inches compacted to 98 percent.
- d. Refer to trenching requirements. Do not displace or damage pipe when compacting.
- e. Connect to building sanitary sewer outlet and municipal sewer system through installed sleeves.

3. Installation - Cleanouts

- a. Form bottom of excavation clean and smooth to correct elevation.
- b. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.
- c. Establish elevations and pipe inverts for inlets and outlets as indicated.
- d. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

4. MANHOLES

- a. General: Install manholes complete with accessories as indicated. Construct concrete channels and benches between inlets and outlets. Set tops of frames and covers flush with finish surface where manholes occur in pavements. Elsewhere, set tops 1 inch above finish surface, unless otherwise indicated.
- b. Place precast concrete manhole sections as indicated and install in accordance with ASTM C 891.
- c. Construct cast-in-place manholes as indicated.
- d. Provide rubber joint gasket complying with ASTM C 443 at joints of sections.
- e. Apply non-shrink grout at inside and outside joints and finish smooth.
- f. Apply coal tar based waterproofing coating from outside.
- g. Apply vapor/moisture penetration preventing epoxy coating from inside.

B. COORDINATION WITH OTHER WORK

1. Coordinate the Work with termination of sanitary sewer connection outside building, connection to municipal sewer utility service, and trenching.

3.05 Field Quality Control

- A. Compaction testing will be performed in accordance with the requirements.
- B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

C. HYDROSTATIC PRESSURE TESTS

1. Air pressure testing of force mains is expressly prohibited.
2. Ensure that permanent joint restraint and properly cured thrust blocking are in place before pressure testing. Restrain ends of pipe to be tested to withstand thrust developed under pressure.
3. Provide the test water, all necessary piping connections between the line to be tested and the source of water supply, test pumping equipment, water meter pressure gage, and other equipment, materials and facilities required for the testing.
4. Test Pressures shall:
 - a. Not be less than 50 psi above the working pressure at the highest point along the test section.
 - b. Not exceed 200 psi.
 - c. Be of at least 2-hour duration when joints are exposed and 4-hours where any joints in the line are covered or backfilled.
 - d. No drop by more than 5 psi, after the test pump is shut-down for 1-hour.
5. Pressurization
 - a. Slowly fill the pipe with water. Maintain flow velocity below 2 fps during filling.
 - b. Apply the specified test pressure, based on the elevation of the lowest point of the line or section under test and correct to the elevation of the test gauge by means of a pump connected to the pipe.
6. Air Removal
 - a. Before applying the specified test pressure, expel air completely from the pipe.
 - b. If permanent air vents are not located at all high points, install corporation cocks at such points to expel air as the line is filled with water.
 - c. After all the air, has been expelled, close the corporation cocks and apply the test pressure.
 - d. At the conclusion of the pressure test, remove the corporation cocks and plug.
7. Dispose of test water in a manner approved by the Engineer and Owner.
8. Examination
 - a. Carefully examine all exposed pipes, fittings, valves, and joints.
 - b. Repair or replace with sound material any damaged or defective pipe, fittings, valves, or leaking joints that are discovered and repeat the test until it is satisfactory to the Engineer.

D. DEFLECTION TEST:

1. Deflection tests shall be performed on all flexible pipes. The test shall be conducted after the final backfill has been in place for at least 30 days.
2. No pipe shall exceed a deflection of 5%.

3. If the deflection test is to be run using a rigid ball or mandrel, it shall have a diameter equal to 95% of the inside diameter of the pipe. The test shall be performed without mechanical pulling devices.

PART 4 SCHEDULES – NOT USED

END OF SECTION

STORM SEWER SYSTEMS 33 40 00

PART 1 GENERAL

1.01 SUMMARY

- A. GENERAL DESCRIPTION includes Site storm sewerage drainage piping, fittings and accessories, and bedding. Connection of building storm water drainage system to municipal sewers. Catch basins, paved area drainage, site surface drainage, and storm-water detention facilities.
- B. THE GENERAL PROVISIONS of the Contract including General and Supplementary Conditions, Division 1 General Requirements, and Instructions to Bidders apply to the Work included in this Division.

1.02 REFERENCES

- A. AASTHO M294 and M252 - Corrugated Polyethylene pipe smooth interior.
- B. AASHTO M36 - Metallic (Zinc or Aluminum) Coated Corrugated Steel Culverts and Underdrains.
- C. AASHTO T180 - Moisture-Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and an 18-in. (457 mm) Drop.
- D. ANSI/ASTM C14 - Concrete Sewer, Storm Drain, and Culvert Pipe.
- E. ANSI/ASTM C76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
- F. ANSI/ASTM C425 - Compression Joints for Vitrified Clay Pipe and Fittings.
- G. ANSI/ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
- H. ANSI/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.
- I. ANSI/ASTM D3034 - Type PSM Poly Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- J. ASTM D2922 - Test Methods for Density of Soil and Soil- Aggregate in Place by Nuclear Methods (Shallow Depth).
- K. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

1.03 SUBMITTALS

- A. PRODUCT DATA: Provide catalog materials indicating pipe, pipe accessories, and fittings including manufacturer's installation instructions indicating special procedures required to install products specified.
- B. SHOP DRAWINGS - Drawings and data including but not be limited to, the following:
 - 1. Details of joints
 - 2. Gasket material
 - 3. Pipe length
- C. Manufacturer's Certificate: Certify that products meet or exceed ASTM designations.
- D. Test Reports

1. Certified Test Reports: Before delivery of materials and equipment, four certified copies of the reports of the tests required in referenced publications or specified herein shall be submitted and approved. The testing shall have been performed in a laboratory meeting the requirements specified. The tests shall have been performed within three years of submittal of the reports for approval. Test reports shall be accompanied by notarized certificates from the manufacturer certifying that the tested material and equipment is of the same type, quality manufacture and make as that proposed to be supplied.
2. Concrete Pipe: Certified copies of test reports shall include strength tests of concrete pipe. Strength tests for concrete piping shall be the three-edge bearing tests. Test reports shall be furnished prior to installation of piping.

1.04 QUALITY ASSURANCE

A. QUALIFICATIONS

1. Environmental Compliance: Comply with applicable portions of local environmental agency regulations pertaining to storm sewerage systems.
2. Utility Compliance: Comply Arkansas Department of Transportation standards for installation of storm drainage systems and provide any additional submittal such as "as-built" drawings.

1.05 SYSTEM DESCRIPTION

A. EXTENT OF WORK - As identified in the drawings and schedules as it relates to this section.

1.06 OWNER'S INSTRUCTIONS AND MAINTENANCE - Refer to Section 01 77 00 for the General requirements for Contract Close-out.

A. PROJECT RECORD DOCUMENTS

1. Accurately record actual locations of pipe runs, connections, catch basins, cleanouts, and invert elevations.
2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

PART 2 PRODUCTS

2.01 MATERIALS

A. Sewer Pipe Materials and Accessories

1. Reinforced Concrete Pipe: Comply with requirements of ASTM C 76, Class III unless another class type is indicated on Drawings, installed with flexible plastic (Bitumen) gaskets at all joints. Gaskets shall comply with AASHTO M-198 75I, Type B, and shall be installed in strict accordance with pipe manufacturer's recommendations.
2. Spiral Rib Metal Pipe Type 1R: Galvanized or aluminized with a polymer coating (10 mil) on both sides as specified on Drawings. Only permitted when specified on Drawings. Pipe ends shall be re-corrugated and installed with semi-corrugated Hugger-type bands and "O" ring gaskets in accordance with pipe manufacturers installation requirements. Spiral Rib metal pipe must comply

with ASTM M-245 for Type IA or IR. Acceptable manufacturer: CONTECH, IN "ULTRA FLO:"/"ULTRA FLO II" or equivalent.

3. Polyvinyl Chloride (PVC) Pipe: Only permitted when specifically indicated on Drawings. Pipe and fittings shall comply with ASTM D 3034, rated SDR 35. Pipe shall be continually marked with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM D 3034 classification. Pipe joints shall be integrally molded bell ends in accordance with ASTM D 3034, Table 2, with factory supplied elastomeric gaskets and lubricant.
4. High-Density Polyethylene Pipe (HDPE) Smooth Interior: Only permitted when specifically indicated on Drawings and shall conform with AASHTO Designation M294 and M252. Pipe must be installed in accordance with pipe manufacturers installation Guidelines for Culvert and Other Heavy-Duty Drainage Applications. Acceptable manufacturers: Advanced Drainage Systems, Inc. (ADS) N-12 & HANCOR, INC. (Hi-Q smooth interior).
5. Polyvinyl Chloride (PVC) large diameter closed profile gravity sewer pipe, UNL-B-9: Only permitted when specifically indicated on drawings. Pipe and fittings shall comply with ASTM F-794. Pipe must be installed in accordance with pipe manufacturers' installation guidelines. Acceptable manufacturer: Carlon (Vylon H.C.).

B. INLETS AND CATCH BASINS

1. Lid and frame per details shown on plans.
2. Base Pad: Cast-in-place concrete of type specified or precast reinforced concrete pad.

2.02 FINISHES – NOT USED

2.03 ACCESSORIES – NOT USED

2.04 FABRICATION – NOT USED

PART 3 EXECUTION

3.01 EXAMINATION OF SITE

- A. REFER TO DIVISION 1 for General Requirements
- B. Review of Existing Conditions
 1. Verify that trench cut, and excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on civil engineering drawings.

3.02 DELIVERY, STORAGE AND HANDLING

- A. Proper facilities shall be provided for handling and lowering sections of pipe into place to avoid injury or damage. The damaged pipe or pipe with damaged coating shall be removed from the site and replaced with satisfactory pipe at no additional cost to the Owner.

3.03 PREPARATION

- A. JOB CONDITIONS – NOT USED

B. SURFACE PREPARATIONS

1. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.
2. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.04 CONSTRUCTION

A. CONSTRUCTION / INSTALLATION

1. BEDDING

- a. Excavate pipe trench in accordance with Section 31 23 00 for work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated.
- b. Place bedding material at trench bottom, level materials in continuous layer not exceeding 8 inches compacted depth.
- c. Maintain optimum moisture content of bedding material to attain required compaction density.

2. INSTALLATION - PIPE

- a. Install pipe, fittings, and accessories in accordance with ASTM C12, ASTM D2321 manufacturer's instructions and/or state or local requirements. Seal joints watertight.
- b. Place pipe on minimum 4-inch-deep bed of filter aggregate.
- c. Lay pipe to slope gradients noted on civil drawings; with maximum variation from true slope of 1/8 inch in 10 feet.
- d. Install aggregate at sides and over top of pipe. Provide top cover to minimum compacted thickness of 12 inches, compact to 98 percent.

3. INSTALLATION - CATCH BASINS AND INLETS

- a. Form bottom of excavation clean and smooth to correct elevation.
- b. Form and place cast-in-place concrete base pad, with provision for storm sewer pipe end sections, or place precast reinforced concrete pad at the locations and elevations as specified on the plans.
- c. Level top surface of base pad to receive concrete shaft sections, sleeved to receive storm sewer pipe sections.
- d. Establish elevations and pipe inverts for inlets and outlets as indicated.
- e. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

B. COORDINATION WITH OTHER WORK

1. Coordinate the Work with termination of storm sewer connection outside building, connection to municipal sewer utility service, and trenching.

3.05 FIELD QUALITY CONTROL – NOT USED

3.06 ADJUSTING, CLEANING, AND PROTECTION OF WORK – NOT USED

PART 4 SCHEDULES – NOT USED

END OF SECTION