

PROJECT MANUAL

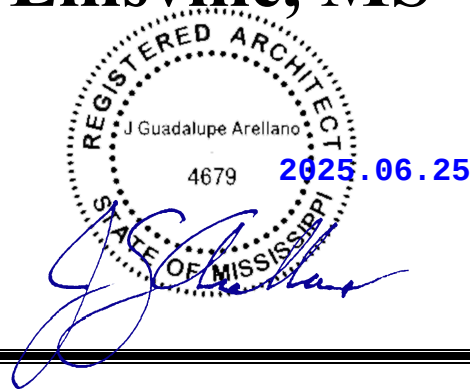
2024922

South Jones High School

Athletic Buildings

Jones County School District

Ellisville, MS



June 25, 2025

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SET NO. _____



Columbus, MS

Michael W. Taylor, AIA : Corey D. Ravenhorst, PE
P.O. Box 167 : 102 Rosecrest Dr. : Columbus, MS 39703 : P 662 327 8990 : F 662 327 8991

Tupelo, MS

William V. Dexter, Jr., AIA
P.O. Box 7066 : 431 West Main Street, Suite 300 : Tupelo, MS 38802 : P 662 840 8062 : F 662 840 8092

Brandon, MS

J. Guadalupe Arellano, AIA
2151 Highway 18 : Brandon, MS 39042 : P 601 829 6915 : F 601 829 6916

Reform, AL

Michael W. Taylor, AIA
P.O. Box 83 : 418 First Avenue West : Reform, AL 35481 : P 205 828 0039

South Jones High School
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Jones County School District
Ellisville, Mississippi

SECTION 00 01 06
CONSULTANT LIST AND SEALS

Project South Jones High School - Athletic Buildings

Owner Jones County School District

Architect PryorMorrow PC
Jose Guadalupe Arellano, AIA, CSI, NCARB
Coby Dennis, Intern Architect
2151 Hwy 18, Suite A (39042)
P. O. Box 1885
Brandon, Mississippi 39043-1885
Phone: (601) 829-6915
Fax: (601) 829-6916
email: jarellano@pryor-morrow.com
email: cdennis@pryor-morrow.com

Civil Engineer Jake Keys, P.E.
Engineering Service
115 Aero Smith Drive
Richland, MS 39218
Phone: (601) 939-8737
Email: jkeys@engservice.com

Structural Engineer Mike Godfrey, P.E.
Second Moment, LLC
P.O. Box 889
Florence, MS 39073
Phone: (601) 845-1655
Fax: (601) 955-0769

Mechanical Engineer Kevin Starks, P.E.
Jason Kackley
GSK Mechanical, Inc.
201 Park Court, Suite A
Ridgeland, MS 39157
Phone: (601) 605-2930
Fax: (601) 493-3111

Electrical Engineer Chris Green, P.E.
The Power Source. PLLC
605 Highway 51
Ridgeland, MS 39157
Phone: (601) 605-4820
Fax: (601) 605-4875

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SECTION 00 11 13
ADVERTISEMENT FOR BIDS

NOTICE TO BIDDERS

Sealed bids will be received in the Jones County School District's Front Desk, 5204 Highway 11 North, Ellisville, Mississippi, until **3:00 p.m. on Tuesday, July 29, 2025**, for:

2024922 South Jones High School Athletic Buildings
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Ellisville, Mississippi

Bid documents are being made available via original paper copy or electronically. Planholders are required to log-in or register for an account at www.pryormorrowplans.com to view and order Bid Documents. All planholders are required to have a valid email address for registration. Bid documents are non-refundable and must be purchased through the website. Electronic bids are not required; however, a submission of an electronic bid in lieu of a sealed bid shall be submitted at www.pryormorrowplans.com.

Bid preparation will be in accordance with Section 00 21 13 – Instructions to Bidders, bound in the Project Manual. Questions regarding website registration, online orders, and electronic bidding please contact Plan House Printing at (662) 407-0193.

BID GUARANTEE: Proposals shall be submitted with Proposal Security in the form of Certified Check or acceptable Bid Bond in an amount equal to at least five percent (5%) of the base bid; such security is to be forfeited as liquidated damages, not penalty, by any bidder who fails to carry out the terms of the proposal. The Bid Bond, if used, shall be payable to the Owner. Bonds on the project must be received on or before the period scheduled for the project and no bid may be withdrawn after the scheduled closing time for the project. Bids must be firm for a period of forty-five (45) days after the scheduled time of opening.

PERFORMANCE-PAYMENT BOND: A 100% Performance-Payment Bond issued by a surety company authorized to do business in the State of Mississippi will be required within ten (10) days after the successful bidder has been notified of the award of the contract to him.

CERTIFICATE OF RESPONSIBILITY: All bids submitted by a prime or subcontractor for public works or public projects where said bid is in excess of fifty thousand dollars (\$50,000) to perform contracts enumerated in Section 31-3-21, Mississippi Code of 1972, shall contain on the outside or exterior of the envelope or container of such bid the contractor's current certificate number. No bid shall be opened or considered unless such contractor's current certificate number appears on the outside or exterior of said envelope or container or unless there appears a statement on the outside or exterior of such envelope or container to the effect that the bid enclosed therewith does not exceed fifty thousand dollars (\$50,000). When bids are submitted electronically, the requirement for including a certificate of responsibility, or a statement that the bid enclosed does not exceed Fifty Thousand Dollars (\$50,000.00), on the exterior of the bid envelope shall be deemed in compliance by including the same information as an attachment with the electronic bid submittal.

The Owner reserves the right to reject any or all bids and to waive irregularities.

Publish: June 25, 2025
July 2, 2025

END OF SECTION

SECTION 00 21 13
INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.01 GENERAL INFORMATION

- A. Should a bidder find discrepancies in or omissions from the drawings or specifications or be in doubt as to their written meaning, the bidder should immediately notify the Architect who will then send a written instruction or interpretation to all known holders of the documents. Neither the Owner nor the Architect will be responsible for oral instructions or any other communications not included in the documents or addenda.
- B. It is understood and agreed that refinement and detailing of the drawings and specifications will occur from time to time. No adjustment in the contract sum or completion date shall be made unless such refinement results in changes to the scope, quality, or function of the work not reasonably inferable or anticipatable. Notwithstanding anything contained in this Contract to the contrary, the Contractor will receive no increase in the contract sum based on the increased cost of the work resulting from change orders or increased cost of any allowance items unless the change required is beyond the scope of the work.
- C. The Contractor shall not use in the project any new materials containing asbestos, asbestos products, polychlorinated biphenyl (PCB), or other toxic substances. If the Contractor discovers that such substances as described herein have been specified or do exist in the project, the Contractor shall promptly notify the Architect in writing and make substitutions for these products at no cost to the Owner.

1.02 METHOD OF BIDDING

- A. Lump sum single bids received from General Contractors for all work shown on drawings or specified herein.

1.03 BID DOCUMENTS

- A. Bid documents are being made available via original paper copy or electronically. Planholders are required to log-in or register for an account at www.pryor-morrowplans.com to view and order Bid Documents. All planholders are required to have a valid email address for registration. Bid documents are non-refundable and must be purchased through the website. Questions regarding website registration and online orders please contact Plan House Printing at (662) 407-0193

1.04 PREPARATION OF BID

- A. Condition of Work: Each bidder must fully inform himself of the conditions relating to the construction of the project and employment of labor thereon. Failure to do so will not relieve a successful bidder of his obligation to furnish all material and labor necessary to carry out the provisions of his contract.

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- B. Examination of Site: All bidders, including the General Contractor and subcontractors, will visit the site of the project and inform themselves of all conditions. Failure to visit the site will in no way relieve the successful bidder from furnishing any materials or performing any work required to complete work in accordance with the drawings and the Project Manual without additional cost to the Owner.

1.05 PROPOSALS

- A. Make all proposals on the forms provided and fill in all applicable blank spaces without interlineation, alteration, erasure, or recapitulation of the work to be done.
- B. Oral proposals will not be considered.
- C. Indicate receipt of addenda issued during the bidding on the proposal form.
- D. On the outside of the bid envelope, indicate the following:
 - 1. Name of the company submitting the bid.
 - 2. Certificate of Responsibility number.
 - 3. Project name.
- E. **Provide one (1) original copy of the Proposal Form.**
- F. If the bid is mailed, place the bid envelope inside a second envelope to prevent inadvertent premature opening of the proposal. Indicate on the outside envelope "Bid Enclosed."
- G. When bids are submitted electronically, the requirement for including a certificate of responsibility, or a statement that the bid enclosed does not exceed Fifty Thousand Dollars (\$50,000.00), on the exterior of the bid envelope shall be deemed in compliance by including the same information as an attachment with the electronic bid submittal.

1.06 OPENING OF BIDS

- A. Bids will be publicly opened shortly after the time stated in the Advertisement for Bids. Bidder representatives are invited; however, attendance is not mandatory. Preventing the opening of bids at the advertised date and time due to Force Majeure Event reasons will result in bids being received and publicly opened by the next business day that the agency shall be open and at the previously advertised time unless an Addendum is issued.

1.07 CERTIFICATE OF RESPONSIBILITY

- A. Each Contractor submitting a bid equal to or in excess of \$50,000 must show on his bid and on the face of the envelope containing the bid his Certificate of Responsibility number, as required by Section 31-3-21, Mississippi Code (latest revision) and as required by the Statutory Amendments of the Contractors Act of 1985.

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- B. Sufficient evidence that said Certificate of Responsibility has been issued and is in effect at the time of receiving bids must be submitted as required by the Owner and the Architect.
- C. If the submitted bid does not exceed \$50,000, a Certificate of Responsibility is not required. If a bidder submits a bid not exceeding \$50,000, a notation stating "BID DOES NOT EXCEED \$50,000" must appear on the face of the envelope.
- D. Bids without a Certificate of Responsibility number or the notation "BID DOES NOT EXCEED \$50,000" will not be opened.

1.08 NON-RESIDENT CONTRACTORS

- A. A non-resident Contractor submitting a bid for a public project in Mississippi must submit a copy of his or her state's policy on non-resident contractors with the bid as required by the Mississippi Code.

1.09 SUBCONTRACTS

- A. The bidder is specifically advised that any proposed subcontractors must be acceptable to the Owner.
- B. Each subcontractor whose portion of the work exceeds \$50,000 shall maintain a valid Certificate of Responsibility.
- C. Within five (5) days after the bid opening, the successful bidder shall identify all proposed subcontractors. Indicate the Certificate of Responsibility number for all subcontractors whose portion of the work exceeds \$50,000. The bidder assumes the risk that the proposed subcontractors are acceptable to the Owner and shall not make substitutions unless agreed to by the Owner.

1.10 BID SECURITY

- A. Each bid must be accompanied by the bidder's certified check or a bid bond, duly executed by the bidder as principal and having surety thereon, a surety company approved by the Owner and signed by a resident agent in Mississippi, in the amount of five percent (5%) of the Base Bid.
- B. When the bid is submitted electronically, the low bidder shall provide an original bid bond as required herein within 72 hours of opening bids to the Architect. If the original bid bond is not received within the 72 hours, the proposal will be rejected as non-responsive.
- C. All bid bonds must be accompanied by an appropriate Power of Attorney designating the Mississippi Resident Agent.
- D. If written acceptance of the Bid is mailed, telegraphed, or delivered to the successful bidder within 45 days after the opening of bids, the bidder shall execute and deliver the specified form of agreement to the Owner within 10 days of receiving written acceptance or face forfeiture of the Bid Security. The Bid Security, in the sum of five percent (5%) of the Base Bid amount, shall become the property of the Owner in the event the contract

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and bond required are not executed within the established time frame. The Bid Security becomes the property of the Owner as liquidated damages for the delay of the project and the additional expense caused to the Owner thereby.

- E. If written acceptance of the Bid is mailed, telegraphed, or delivered to the successful bidder after the 45-day deadline and the successful bidder does not withdraw his or her proposal, the bidder shall execute and deliver the specified form of agreement to the Owner within 10 days of receiving written acceptance. After 45 days, the bid bond is not forfeited.

1.11 AWARD OF CONTRACT

- A. Contract will be awarded on the basis of the lowest and best bid or lowest and best combination of base bid and those alternates, which produce a total within available funds.
- B. The Owner reserves the right to waive irregularities and to reject any or all bids.
 - 1. Irregularities: the omission of any information requested on the Proposal Form may be considered as an informality, or irregularity, by the awarding public body when in their opinion the omitted information does not alter the amounts contained in the submitted bid proposal, or place other Bidders at a disadvantage.
- C. The Owner reserves the right to disqualify and reject the low bidder and make award to other than the low bidder if, in the Owner's judgment, it is in the Owner's best interest. A bidder may be disqualified for:
 - 1. Being in arrears on existing contracts.
 - 2. Being in litigation with the Owner.
 - 3. Having defaulted on or failed to satisfactorily complete a previous contract including warranty obligations.

1.12 NOTICE TO PROCEED

- A. The Contractor shall commence work to be performed under this Agreement on a date to be specified in a written order of Notice to Proceed from the Architect.

END OF SECTION

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SECTION 00 25 14

PRE-BID MEETING

PART 1 - GENERAL

1.01 PRE-BID CONFERENCE

- A. A pre-bid conference will be held at 2:00 PM on July 17, 2025, at Jones County School District Central Office, located at 5204 Highway 11 North, Ellisville, Mississippi. All plan holders are encouraged to attend.

END OF SECTION

SECTION 00 31 32
GEOTECHNICAL DATA

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. A copy of the Geotechnical Report is enclosed herein.
- B. Related Sections:
 - 1. Division 2, 31, 32, and 33
- C. Any party discovering a conflict between the Specifications and the Geotechnical Report shall immediately notify the Architect in writing.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prospective bidders should read and understand the Geotechnical Report before submitting bids or executing the Agreement.

END OF SECTION

BURNS COOLEY DENNIS, INC.

GEOTECHNICAL AND MATERIALS ENGINEERING CONSULTANTS

Corporate Office
551 Sunnybrook Road
Ridgeland, MS 39157
Phone: (601) 856-9911
Fax: (601) 853-2077

Mailing Address
Post Office Box 12828
Jackson, MS 39236

www.bcdgeo.com

Materials Laboratory
278 Commerce Park Drive
Ridgeland, MS 39157
Phone: (601) 856-2332
Fax: (601) 856-3552

June 6, 2025

Jose Guadalupe Arellano, AIA, NCARB, CSI
PryorMorrow PC
2151 Highway 18
Brandon, Mississippi 39042

Report No. 250221

**Geotechnical Exploration
South Jones High School Athletic Buildings
Jones County School District
Ellisville, Mississippi**

Dear Mr. Arellano:

Submitted here is the report of our geotechnical exploration for the above-captioned project. This exploration was authorized by your e-mail on April 8, 2025, and was generally performed in accordance with our Proposal No. 25001P-77 dated March 15, 2025.

We appreciate the opportunity to be of service. If you should have any questions concerning this report, please do not hesitate to call us.

Very truly yours,

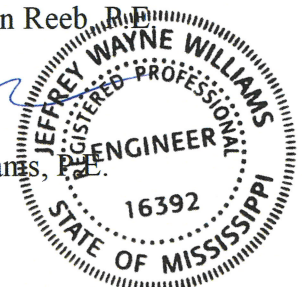
BURNS COOLEY DENNIS, INC.

Amber Templeton Reeb

Amber Templeton Reeb, R.E.

Jeffrey W. Williams

Jeffrey W. Williams, P.E.



JWW/ATR/khb
Copies Submitted: (via e-mail)

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FIGURES

1.0 INTRODUCTION

1.1 Project Description

Plans are being made for the construction of three new athletic buildings at South Jones High School located at 313 Anderson Street in Ellisville, Mississippi. The first building will be constructed just northeast of the intersection of Carter Street and Devall Street (~800 sq ft), the second building will be constructed between two ball fields (~2,400 sq ft) and the third and largest building will be constructed on the east side of the existing track (~6,900 sq ft). The proposed buildings will generally consist of lightly loaded, one-story structures. New parking lots will be constructed on the east and south sides of the second building and on the south side of the third and largest building. Based on the provided topographic survey, the existing ground surface elevations within the proposed construction area for the first building range from about 236 ft to 237 ft. Based on the provided topographic survey, the existing ground surface elevations within the proposed construction area for the second building range from about 246 ft to 248 ft. Topographic information has not been provided for the proposed construction area for the third and largest building. Details regarding grading plans have not been provided; however, we anticipate only nominal cutting and/or filling (+/- 3ft) will be required to construct level pads to provide drainage away from the buildings and across the parking lots. The proposed construction areas for the new buildings contain some existing structures and pavement.

1.2 Purposes

The specific purposes of this exploration were:

- 1) to make exploratory soil borings within the areas planned for construction of the new buildings and parking lots;
- 2) to verify field classifications and to evaluate pertinent physical properties of the soils encountered in the borings by means of visual examination of the soil samples in the laboratory and routine tests performed on the samples; and
- 3) after analysis of the soil boring and laboratory test data, to provide recommendations for site preparation, earthwork construction, and foundation design and construction, and to also provide guideline recommendations for pavement design and construction.

Our current scope of work does not include: environmental study; detailed slope and trench stability analyses; dewatering analyses; detailed pavement design; structural foundation and retaining wall design; retaining wall recommendations; review of plans and specifications; responses to contractor requests for information (RFIs); and construction phase services.

2.0 FIELD EXPLORATION

2.1 General

Subsurface soil conditions within the areas planned for construction of the new buildings and parking lots were explored by means of eleven (11) soil borings. Borings 1 through 7 were made to an exploration depth of 15 ft within the proposed construction areas for the buildings. Borings 8 through 11 were made to a depth of 6 ft within new parking lot areas. The approximate locations of the borings are shown on Figures 1A and 1B. The borings were approximately located in the field using GPS coordinates that were generated using the provided site plan overlaid on Google Earth.

All soils were classified in general accordance with the Unified Soil Classification System. A synopsis of the Unified Soil Classification System is presented on Figure 2 along with symbols and terminology typically utilized on graphical soil boring logs. Graphical logs of the borings are presented on Figures 3 through 13. The graphical logs illustrate the types of soil and stratification encountered with depth below the existing ground surface at the individual boring locations. Approximate GPS coordinates for the boring locations as determined by our drilling personnel using a hand-held device are shown at the bottom of the graphical boring logs within the “Comments” section. Ground elevations at the boring locations were not determined.

2.2 Drilling Methods and Groundwater Observations

The borings were advanced full depth by dry augering. Observations were made continuously during auger drilling to detect free water entering the open boreholes. Notes pertaining to groundwater observations are included at the bottom right corner of the graphic boring logs.

2.3 Sampling Methods

Both undisturbed and disturbed samples were obtained in Borings 1 through 7 made within the proposed building areas. Relatively undisturbed samples were obtained in Borings 1 through 7 by pushing a 3-in. OD Shelby tube sampler approximately 2 ft into the soil within the depth intervals illustrated as shaded portions of the "Samples" column of the graphic logs for Borings 1 through 7. Disturbed samples of the soils encountered in Borings 3, 4, 6, and 7 were obtained by driving a standard 2-in. OD split-spoon sampler 18 in. into the soil with a 140-lb hammer falling freely a distance of 30 in. The depths at which the split-spoon samples were taken are indicated by crossed-slashed symbols under the "Samples" column of the graphic logs for Borings 3, 4, 6, and 7. The number of blows required to drive the split-spoon sampler each 6-in. increment (total of 18 in. of penetration) is recorded under the "Field SPT Data" column of the graphic logs. The standard penetration test (SPT) blow count required to penetrate the last foot (sum of the second and third blow count values) is considered the N_{60} value and is plotted as a small circled x in the data section of the graphic logs. The relatively undisturbed Shelby tube and/or split-spoon samples were obtained at approximate 3-ft to 5-ft intervals of depth in Borings 1 through 7.

Disturbed auger cutting samples were obtained at approximate 2-ft and 3-ft depth intervals in pavement Borings 8 through 11. Disturbed auger cutting samples were also taken near the ground surface in building Borings 1 through 7. The depths at which the auger cutting samples were taken are illustrated as small I-shaped symbols under the "Samples" column of the graphic boring logs.

2.4 Field Classification, Sample Preservation, and Borehole Abandonment

All soils encountered during drilling were examined and classified in the field by a geotechnical engineering technician. Each Shelby tube sample was extruded from the sampling tube in the field. An approximate 6-in. long portion of each Shelby tube sample was sealed with melted paraffin in a cylindrical cardboard container to prevent moisture loss and structural disturbance. An additional portion of each Shelby tube sample, representative portions of the split-spoon samples and the auger cutting samples were sealed in jars to provide material for visual examination and testing in the laboratory. Unless other disposition is requested, we routinely discard soil samples after about six months of storage. The boreholes were plugged with soil

cuttings after completion of drilling and sampling. Borings 4 and 6 through 11, made within an existing asphalt-surface pavement, were also patched at the surface with cold mix asphalt.

3.0 LABORATORY TESTING

3.1 General

All of the soil samples were examined in the laboratory by a geotechnical engineer and tests were performed on selected samples to verify field classifications and to assist in evaluating the strength, and volume change properties of the soils encountered. The types of laboratory tests performed are described in the following paragraphs.

3.2 Strength Tests

The undrained shear strength characteristics of the soils encountered in the borings were investigated by means of visual estimates of consistency, from the results of the SPT tests and from the results of unconfined compression (UC) and unconsolidated undrained (UU) triaxial compression tests performed on selected undisturbed Shelby tube samples. The cohesions resulting from the UC and UU triaxial compression tests are plotted as small open circles and triangles, respectively, in the data section of the graphic logs. The water content and dry density were also determined for the compression test specimens. The water contents are plotted as small shaded circles in the data section of the graphic boring logs. The dry densities are tabulated to the nearest lb per cu ft under the “Dry Density” column of the logs.

3.3 Classification Tests

The classifications and volume change properties of the fine-grained soils encountered in the borings were investigated by means of Atterberg liquid and plastic limit tests performed on selected representative samples. The results of the liquid and plastic limit tests are plotted as small crosses interconnected by dashed lines in the data section of the graphic boring logs. In accordance with the Unified Soil Classification System, fine-grained soils are classified as either clays or silts of low or high plasticity based on the results of Atterberg limit tests. The numerical difference between the liquid limit and plastic limit is defined as the plasticity index (PI). The magnitudes of the liquid limit and plasticity index and the proximity of the natural water content to the plastic

limit are indicators of the potential for a fine-grained soil to shrink or swell upon changes in moisture content or to consolidate under loading. The proximity of the natural water content to the plastic limit is also an indicator of soil strength.

The classifications of soils consisting predominantly of sand or containing some sand were investigated by means of minus No. 200 sieve test performed on selected samples. The percentages of fines resulting from the minus No. 200 sieve tests are tabulated at the appropriate depths under the “% Passing No. 200 Sieve” column of the graphic boring logs.

3.4 Water Content Tests

Water content tests were performed on all samples upon which strength tests were not conducted to corroborate field classifications and to extend the usefulness of the strength, plasticity and SPT blow count data. The results of the water content tests are plotted as small shaded circles in the data section of the graphic boring logs. The water content data have been interconnected on the logs to illustrate a continuous profile with depth.

4.0 GENERAL SUBSURFACE CONDITIONS

4.1 General

A general description of subsurface soil and groundwater conditions revealed by the borings made for this exploration is provided in the following paragraphs. The graphical logs shown on Figures 3 through 13 should be referred to for specific soil and groundwater conditions encountered at each boring location. Stick logs of the borings are shown in profile on Figures 14 and 15 to aid in visualizing subsurface soil conditions. Tabulated adjacent to the stick logs are water contents, Atterberg liquid and plastic limits, percentages of fines passing the No. 200 sieve, dry densities, cohesions, and SPT blow counts.

It appears that earthwork had been conducted at the project site in the past. Some soils encountered at the locations of Borings 3 and 4 made for one of the buildings and Borings 8 through 10 made for pavement areas appear to be fill materials placed during past construction activities at the school. It should be understood that it is difficult to distinguish fill from natural soils due to similar colors, lithology and textures; therefore, no attempt was made to distinguish between fill and natural soils on the logs. The borings are only representative of the conditions at

the boring locations. There could be relatively weak and compressible fill materials or large concentrations of organic matter or debris at locations not explored during this exploration. It is not practical to fully characterize old fill materials by means of borings.

4.2 Soil Stratification

Borings 4 and 6 through 11 were made through an existing asphalt pavement. The thickness of the pavement was found to be 3 in. at the locations of Borings 4 and 6 through 11.

Subsurface soils encountered within the 15-ft maximum completion depth of the borings made for this exploration generally consist of sandy clays (CL), silty clays (CL and CL-ML), clays (CH), clayey sands (SC) and silty sands (SM). Medium stiff sandy clays (CL) that are considered to have low-moderate strength and moderate-high compressibility were encountered within the approximate depth interval of 4 ft to 8 ft at Boring 5. The remaining subsurface soils encountered in the borings are considered to have moderate to high strength and low to moderate compressibility. The sandy clays (CL) and silty clays (CL and CL-ML) are considered to have low shrink/swell potential. The sands (SC and SM) have no potential for shrinking and swelling.

Clays (CH) that are considered to be expansive with moderate shrink/swell potential were encountered within the following depth intervals:

- 1 ft to 4 ft and 8 ft to 15 ft at Boring 1
- 4 ft to 15 ft at Boring 2
- 8 ft to 15 ft at Boring 3
- 12 ft to 15 ft at Boring 4
- 13 ft to 15 ft at Boring 5

4.3 Groundwater

Free water was not encountered during auger drilling for the borings. In our opinion, groundwater conditions at the site will primarily be influenced by rainfall, surface drainage, and by the rise and fall of water levels in nearby ditches, creeks, ponds or other bodies of water. Groundwater conditions at the site can also be influenced by man-made changes. Soils which did not exhibit free water during the short time period of drilling may exhibit water seepage at other times during construction and within excavations that remain open for an extended period of time

or that are permanent. Surficial soils can become saturated and weak to relatively shallow depths during periods of prolonged and heavy rainfall.

5.0 DISCUSSION

5.1 General Soil Conditions

Subsurface soils encountered within the 15-ft maximum completion depth of the borings made for this exploration generally consist of sandy clays (CL), silty clays (CL and CL-ML), clays (CH), clayey sands (SC) and silty sands (SM). With the exception of the medium stiff sandy clays (CL) encountered within the approximate depth interval of 4 ft to 8 ft at Boring 5, the subsurface soils encountered in the borings are considered to have moderate to high strength and low to moderate compressibility. The medium stiff sandy clays (CL) are considered to have low-moderate strength and moderate-high compressibility. The sandy clays (CL) and silty clays (CL and CL-ML) are considered to have low shrink/swell potential. The sands (SC and SM) have no potential for shrinking and swelling.

The shallow soils encountered in Borings 3 and 4 made for one of the buildings and Borings 8 through 10 made for pavement areas appear to be fill materials that were likely placed during past construction activities at the school. There is risk that compressible or otherwise unsuitable material and buried foundations, slabs, and pavements within the apparent fill will not be discovered. We recommend that the exposed soils be investigated during site preparation as discussed subsequently in this report. If unstable soils or buried materials are encountered, they should be addressed at that time likely through removal and replacement with compacted select fill material.

Clays (CH) that are considered to be expansive with moderate shrink/swell potential were encountered at depths ranging from 1 ft to 13 ft below the ground surface in Borings 1 through 5. Refer to the profile sheets found on Figures 14 and 15 for the approximate depths at which expansive clays (CH) were encountered in the borings.

5.2 Expansive Clay Considerations

The moderately expansive clays (CH) can experience significant shrink/swell movements associated with seasonal moisture content fluctuations. Cover materials overlying expansive

clays (CH) buffer moisture content changes within the clays (CH) caused by seasonal weather conditions and transpiration by plants and trees. Thus, the potential magnitude of moisture content changes and associated shrink/swell movements within expansive clays (CH) is proportionate to the thickness of overlying cover materials. Moisture content changes and shrink/swell movements within expansive clays (CH) are lower for greater thicknesses of cover materials. There is a general trend for expansive clays (CH) beneath structures to swell due to an increase in water content caused by capillary and vapor phase movement of moisture within the clays (CH). Expansive clays (CH) will also experience considerable swelling if directly supplied with water from rainfall, sprinkler systems, broken underground water and sewer pipes, or any other source. Trees growing adjacent to a structure can extract a considerable amount of moisture from the ground, resulting in localized shrinkage of expansive clays (CH) accompanied by vertical and lateral movements.

Overburden removal associated with the establishment of finished grades lower than existing ground elevations will cause stress relief in expansive clay (CH) soils resulting in long-term rebound. Expansive clay (CH) soils will also experience long-term downhill creep movements, depending on slope steepness.

5.3 Design Considerations

From a geotechnical standpoint, the primary factors relevant to foundation design and construction for the proposed buildings are bearing capacity, settlement due to soil consolidation/compression under fill and structural loadings and the shrink/swell potential of the expansive clay (CH) soils. Soils classified as medium stiff would provide a low bearing capacity for a shallow foundation and would consolidate under fill and structural loadings. The moderately expansive clays (CH) will experience significant shrink/swell movements associated with seasonal moisture content fluctuations. A foundation system should be utilized for the proposed buildings that will accommodate the anticipated fill and structural loads and minimize future differential vertical movements resulting from soil consolidation under fill and structural loadings or unpredictable shrinking and swelling of the expansive clay (CH) soils associated with seasonal moisture content fluctuations.

For the soil conditions revealed by the borings, it is our opinion that a shallow foundation system could be used for support of the buildings provided: 1) column loads are less than 150 kips and wall loads do not exceed 7 kips per ft; 2) a minimum 5-ft thick buffer of low permeability and

low shrink/swell potential soil is maintained between the expansive clay (CH) soils and the bottom of the floor slab and below finished outside grades adjacent to the buildings; and 3) our recommendations for site preparation and earthwork construction are implemented. The buffer should be measured from either the bottom of the slab or finished outside grades, whichever results in the lower elevation. The recommended soil buffer should minimize, not eliminate, future differential vertical movements within the building caused by shrinking and swelling of the expansive clays (CH) due to moisture content fluctuations. The buildings could be supported by either a stiffened slab-on-grade foundation or a spread-strip footing foundation with a separate slab.

Expansive clays (CH) were encountered at depths of 1 ft and 3 ft in Borings 1 and 2, respectively, made for the first building, at depths of 8 ft and 12 ft in Borings 3 and 4, respectively, made for the second building, and at a depth of 13 ft at Boring 5 made for the third building. Considering the ground elevation contours in conjunction with the boring data, undercutting and backfilling will likely be required within the westernmost building in the vicinities of Borings 1 and 2 to remove a portion of the expansive clays (CH) to create the recommended minimum buffer over the clays (CH). Providing the grades within the footprints of the second and third building are not reduced below current grades, the buffer will be provided by the existing site soils and no undercutting and backfilling will be necessary.

It is our opinion that either flexible asphalt concrete or rigid Portland cement concrete pavement can be utilized for the pavement areas, provided not less than 3 ft of low permeability and low shrink/swell potential buffer soils directly underlie the pavement structure. Expansive clays (CH) were not encountered within the planned construction areas for the new pavement. Therefore, no undercutting and backfilling will be required to remove a portion of the expansive clays (CH) and provide the recommended minimum buffer of low permeability and low shrink/swell buffer.

Details of our recommendations for site preparation, earthwork construction, and foundation design and construction are included in the following subsections of this report. Guideline recommendations for pavement design and construction are also provided.

6.0 RECOMMENDATIONS

6.1 Site Preparation and Earthwork Construction

Unless otherwise noted, our recommendations for earthwork construction are the same for the building and pavement areas. As an initial step of site preparation within the planned construction areas, any existing pavement and structures, any underground utilities or pipes, and any other subsurface obstructions that might interfere with earthwork and foundation construction should be removed and/or relocated. Special care should be taken to thoroughly backfill and compact fill placed in cavities caused by demolition. The soils exposed when the existing structures and pavement are removed may be relatively wet and unstable due to trapped moisture beneath the slabs and pavement.

Stripping should then be performed to a sufficient depth to remove organic-laden surficial soils, vegetation, debris, topsoil, and any weak or high moisture content surficial soils. Next, excavation should be performed to remove any weak soils encountered during stripping. The actual vertical and lateral extent of excavation required to remove weak soils must be determined in the field during earthwork construction. Excavation of weak soils should extend laterally not less than 5 ft beyond the limits of the buildings and 3 ft beyond the edges of pavements.

As previously mentioned, considering the ground elevation contours in conjunction with the boring data, undercutting and backfilling will likely be required within the westernmost building the vicinities of Borings 1 and 2 to remove a portion of the expansive clays (CH) to create the recommended minimum buffer over the clays (CH). Excavation may also be necessary at the locations of Borings 3 and 4 made for a building and Borings 9 through 11 made for pavement areas if additional excavation during construction indicates that the soils are unstable or contain debris. Excavation of weak soils should extend laterally not less than 5 ft beyond the limits of the building.

Care should be taken while excavating/undercutting adjacent to the existing structures to avoid undermining existing structural elements and utilities. The need to excavate/undercut immediately adjacent to the existing structures should be evaluated during construction based on inspection of the soils exposed. To minimize exposure of the existing structure foundation to undermining, excavating/undercutting and backfilling adjacent to the existing structure should be conducted in relatively narrow segments as measured parallel to the structure.

In order to minimize the amount of any excavation and undercutting, we recommend that a representative of Burns Cooley Dennis, Inc. be present to observe excavation/undercutting operations, to assist in evaluating the depth and lateral extent of any excavation/undercutting required, and to evaluate the stability of the soils exposed after stripping and any excavation/undercut area.

Though groundwater was not encountered in the borings, groundwater levels at the site can fluctuate seasonally, and will be influenced by rainfall and surface drainage. Groundwater control requirements will be dependent on the required depth of excavation, the season in which construction is performed and on rainfall preceding and during construction. Construction planning should account for the possibility of encountering saturated soils and water seepage. The means and methods for intercepting, collecting and removing groundwater entering excavations should be the sole responsibility of the earthwork and/or foundation contractor. Contractors are federally mandated to make excavations for the structures in accordance with OSHA regulations. The sandy soils generally meet the requirements of "Type C" soils. We recommend assuming "Type C" soil for all construction planning and estimating. Sloped or braced excavations should be designed by a registered professional engineer.

The effort required to mitigate unstable soils will be influenced by the season of the year when earthwork is performed. The subsurface soils would likely be drier during the hot late summer and could weaken during heavy rainfall events. We recommend that earthwork be performed during a dry summer or fall season, if the schedule permits. It should be recognized that soils which are demonstrated to be adequately stable during stripping, any excavation, scarification/compaction and/or proofrolling can become unstable if they are disturbed by construction traffic or if they are exposed to rainfall prior to filling.

The on-site soils are susceptible to pumping when wet. The construction techniques, types of equipment utilized and site drainage provided during construction will have a great effect on the performance of the soils. The routing of heavy, rubber-tired equipment should be controlled to minimize, as much as possible, traffic in the construction areas. All traffic should be discouraged during periods of inclement weather. If pumping is initiated in the soils, as a construction expedient the pumping can be counteracted by treating these materials with hydrated lime or cement. It is estimated that about 4 to 6 percent hydrated lime or cement by dry weight of soil could be required.

For silty and sandy clays (CL), hydrated lime is recommended. For sands (SC, SM), cement should be used.

We recommend that backfilling and filling to achieve planned grades follow immediately after stripping, any excavation, undercutting, scarification/compaction and/or proofrolling. Imported fill materials should consist of select nonorganic and debris-free silty clays (CL) or sandy clays (CL) having a liquid limit less than 45 and a plasticity index (PI) within the range of 10 to 24, or clayey sands (SC) with a PI in the range of 7 to 15 and a liquid limit less than 35, or slightly clayey silty sands (SM) with a minimum PI of 3. The fill and backfill soils should be compacted from lifts not exceeding 9 in. in loose thickness to not less than **95** percent of standard Proctor (ASTM D 698) maximum dry density or **70** percent relative density (ASTM D 4253 and ASTM D 4254), whichever achieves the greater maximum dry density. Soils should be placed at moisture contents within 3 percentage points of the standard Proctor optimum water content. All backfill in confined areas and over utilities, storm drains, etc., should be placed in accordance with the preceding recommendations, except the lift thickness should be reduced to about 4 in. to 5 in. where hand-operated compaction equipment is used. Stability must be evident during compaction of each lift before any subsequent lifts of fill material are added. Fill materials should extend laterally not less than 5 ft beyond the edges of the buildings and not less than 3 ft beyond pavement edges and then slope down to natural ground at an inclination not steeper than 3H:1V. Finished site grades should be sloped to promote quick runoff of storm water and provide positive drainage away from the buildings on all sides and across the pavement areas. It should be noted that sandy soils are very susceptible to erosion. The quick establishment of turf on freshly graded and filled areas will be critical. The quickest and most effective means of establishing turf will be to place sod.

Laboratory classification tests, including Atterberg limit determinations and grain-size analyses, should be performed on the fill soils initially and routinely during earthwork operations to check for compliance with the recommendations provided herein. Field moisture/density tests should be performed frequently in the scarified and compacted on-site soils and in each compacted lift of fill material to assist in evaluating whether the recommended moisture contents and dry densities are being achieved. As a guide for building earthwork construction, we suggest a minimum of one test per lift for each 2,000 sq ft of surface area or portion thereof. A frequency of

testing considered to be appropriate for the pavement areas is one test per lift for each 5,000 sq ft of surface area or portion thereof.

6.2 Foundation Design Recommendations

6.2.1 Stiffened Slab-on-Grade Foundation. The new buildings could be supported by a foundation system consisting of a slab-on-grade stiffened with perimeter grade beams, or turned-down edges, and interior grade or tie beams. Grade beams should be utilized to support all exterior walls and all interior load-bearing and partition walls, or otherwise they should be spaced in a grid pattern on not greater than about 15-ft to 20-ft centers in each direction, or as otherwise directed by the project structural engineer. Any columns should be supported by widened portions of the grade beams. We recommend that grade beams or turned-down edges around the perimeter of the buildings be brought to bear at a depth not less than 24 in. below finished outside grade. Interior tie or grade beams should be brought to bear at a depth not less than 18 in. below the bottom of the slabs. We recommend that grade beams be proportioned for critical combinations of dead, live and wind loads utilizing a net allowable soil bearing pressure of 1,500 lbs per sq ft. A net allowable soil bearing pressure of 2,000 lbs per sq ft should be utilized to dimension widened portions of grade beams used to support column loads. We recommend a minimum base width of 18 in. for the grade beams. The grade beams should be reinforced for both positive and negative bending. The floor slabs should be reinforced for anticipated loading conditions and deflections and to minimize slab cracking. We recommend that the slabs be reinforced with a grid of relatively closely spaced reinforcing bars in lieu of welded wire fabric.

6.2.2 Spread Footing Foundation. The new buildings could alternatively be supported by a spread-strip footing foundation. For this type of foundation, strip footings should be utilized to support all exterior and interior load-bearing walls, and columns should be supported by square footings. The footings should be founded directly upon strong natural soils or compacted select fill materials. We recommend that footings around the perimeter of the buildings be brought to bear at a depth not less than 24 in. below lowest adjacent finished outside grades. Interior footings should be brought to bear at a depth not less than 18 in. below the bottom of the floor slabs. Strip footings should be proportioned for critical combinations of dead, live and wind loads utilizing a net allowable soil bearing pressure of 1,500 lbs per sq ft. We recommend a minimum width of 18

in. for strip footings. A net allowable soil bearing pressure of 2,000 lbs per sq ft should be used to dimension square footings. We recommend a minimum width of 24 in. for square footings.

Spot footings can be connected with grade beams if needed to better accommodate structural loadings. Footings can be designed for lateral loading considering an allowable passive equivalent fluid unit weight of 200 lbs per cu ft per ft and a sliding resistance coefficient against the base of 0.4, where lateral loads against the structure are not accommodated in uplift and compression.

The uplift capacity of each footing should be computed as the weight of the concrete plus the weight of the backfill immediately above the footing base. The weight of the backfill soils should be computed using a unit weight of 120 lbs per cu ft. The unit weight of the concrete should be taken as 150 lbs per cu ft. The size of the base or the bearing depth of the footing should be increased to provide an uplift capacity that will result in an adequate safety factor against uplift loads as determined by the designer.

The floor slabs of the buildings supported on the spread-strip footing foundation can bear directly upon compacted natural soils and/or select fill materials. The slabs should be adequately reinforced for anticipated loading conditions and deflections and to minimize slab cracking. Stiffening ribs, or grade beams, cast monolithically with the slabs could be utilized to provide rigidity, as determined by the structural engineer.

6.2.3 Settlement. For the shallow foundation system, earthwork performed as recommended, total settlements under compressible structural loading are expected to be on the order of 1 in. and differential movements are generally expected to be on the order of 3/4 in. over a horizontal distance of about 25 ft to 30 ft. It should be noted that differential movements of the magnitude stated in the preceding sentence could result in minor cracking of the foundation, walls and floor slabs, but the structure performance will not be impaired. The actual magnitude of the differential movements can be influenced by any number of events or circumstances that occur during the life of the new buildings. For example, surface drainage conditions, broken water pipes, trees and shrubs, etc., can influence the actual movements which develop.

6.2.4 Foundation Installation. All foundation excavations should be carefully inspected by a knowledgeable soil technician or engineer to verify bearing on generally strong soils. Care

should be taken to minimize disturbance of soils exposed in the bottom of the foundation excavation. We recommend that foundation excavations be left open for the shortest possible duration to minimize exposure of the bearing soils to rainfall. Increases in compressibility and reductions in shear strength can result if water is allowed to pond in the foundation excavations. Drainage should be maintained away from the foundation excavations during construction. Ponded water in the foundation excavations can weaken the exposed soils. Foundation soils exposed in the bottom of the foundation excavations should be inspected prior to concrete placement. If these materials are found to be weak or loose, overexcavation and backfilling will be required to provide strong foundation soils immediately beneath the foundations.

6.3 Guideline Pavement Recommendations

Exact loadings have not been indicated, but we expect both light and heavy loading conditions for the proposed parking lot. The client may have pavement standards they wish to utilize for the pavement structures for the light and heavy loadings. The following are provided for added guidance in lieu of client-provided pavement details. In areas to be paved, there is often some delay between completion of earthwork operations and placement of the pavement structure materials, possibly resulting in deterioration of subgrade conditions. Therefore, we recommend that density and stability of the subgrade soils be confirmed or re-established immediately prior to construction of the pavement.

In our opinion, either flexible asphalt concrete or rigid Portland cement concrete (PCC) pavement can be utilized for the proposed parking lot area. Site preparation and earthwork construction should be performed for the areas to be paved in accordance with the recommendations given in the "Site Preparation and Earthwork Construction" section of this report. Guideline pavement recommendations are given in the following paragraphs that represent typical construction practice. However, we recommend that pavement thicknesses be verified for the actual expected traffic volumes and loadings using appropriate design parameters for the subgrade soils and pavement structure materials. If the subgrade soils are prepared and select fill materials are placed within the areas to be paved in accordance with recommendations provided in this report, it is our opinion that a CBR of 5 would be appropriate to use as the subgrade support value for flexible asphalt concrete pavement. For PCC pavements, it is our opinion that a modulus of subgrade reaction (k) of 150 lbs per cu in. would be appropriate for the subgrade support value.

Where a 6-in. thick granular subbase is utilized under PCC pavements as described in this report, the modulus of subgrade reaction can be increased to up to 325 lbs per cu in.

It is our opinion that chemical treatment of the subgrade soils with hydrated lime or cement will provide the best performing pavement system during construction and will extend the service life of the pavement. For silty and sandy clay (CL) subgrade, we recommend lime treatment for the top 12 in. of the subgrade utilizing 6 percent hydrated lime by dry weight of soil. For sand (SC, SM) subgrade, we recommend cement treatment for the top 12 in. of the subgrade utilizing 6 percent cement by dry weight of soil. The lime-treated and cement-treated subgrade soils should be compacted to not less than **98 percent** of standard Proctor maximum dry density (ASTM D 698). The lime treatment should be in accordance with Section 307 of the 2017 Edition of the Mississippi Standard Specifications for Road and Bridge Construction using the Class C lime treatment procedure. The lime and cement treatment should extend not less than 2 ft beyond the back of curb or edge of pavement.

For light automobile and pickup truck traffic, the flexible pavement structure could consist of a 2-in. thick asphalt surface course and a 4-in. thick asphalt base course on the prepared subgrade soils. A thicker asphalt concrete pavement section should be utilized if the flexible pavement will be subjected to heavy truck traffic. For the heavier loading, the flexible pavement structure could consist of a 2-in. thick asphalt surface course and a 6-in. thick asphalt base course on the prepared subgrade soils. The asphalt concrete surface course materials should conform with all applicable specifications for SC-1, Type 8 presented in the 1990 Edition of the Mississippi Standard Specifications for Road and Bridge Construction. The asphalt concrete base course materials should conform with all applicable specifications for BB-1, Type 6.

For rigid pavement, jointed plain (unreinforced) PCC pavement can be utilized with limited use of steel reinforcement such as described herein. The minimum compressive strength of the concrete mixture should be 4,000 lbs per sq in. It is our opinion that a 5-in. thick PCC pavement cast directly upon the prepared subgrade soils would be appropriate for light automobile and pickup truck traffic. For heavy truck traffic, a 7-in. thick PCC pavement directly underlain and separated from the prepared subgrade soils by a granular subbase would likely be required. We recommend the use of 8-in. thick PCC pavement directly underlain and separated from the prepared subgrade soils by a granular subbase immediately in front of any garbage dumpsters to provide support for the wheels of a garbage truck during loading.

We recommend the use of a 6-in. thick granular subbase directly under PCC pavements that support heavy truck traffic. This granular subbase is part of the pavement structure and prevents subgrade soils from pumping up through joints. We recommend that the granular subbase materials consist of No. 610 crushed limestone. The portion of the crushed limestone passing the No. 40 sieve should have a liquid limit not greater than 25 and a plasticity index not greater than 5. The crushed limestone should be compacted to not less than **100 percent** of standard Proctor maximum dry density (ASTM D 698) at moisture contents within 2 percentage points of the optimum water content. The pavement surface should be sufficiently elevated to allow drainage of the granular subbase.

General guidance for the design and construction of PCC pavements is presented in ACI 330 “Guide for the Design and Construction of Concrete Parking Lots,” including proper jointing, thickened edges that receive heavy truck traffic, thickened edges or load transfer devices at construction joints, tie-bars, and steel reinforcement in irregular shaped slabs or panels. Joints should form panels that are approximately square with the longest panel dimension no more than 1.25 times the shortest panel dimension. The maximum joint spacing should be 10 ft for 5-in. thick and 15 ft for the 7-in. or 8-in. thick PCC pavements. The pavement joints should be properly sealed and maintained. We recommend that a jointing plan and details be developed for construction of the PCC pavements. Burns Cooley Dennis, Inc. can be contracted to provide this additional service if we are provided with a CAD file of the proposed site. As an alternative, BCD can be contracted to review and approve jointing layouts and details that are generated by others. The surface of the pavement should be crowned and sloped to promote quick runoff of storm water.

6.4 Other Design and Construction Considerations

It should be noted that utility trench and foundation excavations made through the on-site nonplastic sands will slough. The contractor should be made aware of this issue. Nonplastic sands will also be susceptible to erosion and surface protection will need to be provided. The best method for protecting the surface is plating the sands with about 12 in. to 18 in. of silty clays (CL) and sandy clays (CL). This plating material along with some topsoil will also be necessary to facilitate growth of grass.

If flower and shrub beds including sprinkler systems are placed adjacent to the buildings, the beds should be prepared such that they do not trap water, and sprinklers should be operated

only enough to satisfy the water demands of the plants and shrubs. Excessive watering and ponding within the flower and shrub beds could result in downward percolation of water into the underlying foundation soils causing them to lose strength. Rainwater falling on the roof of the buildings should be collected and prevented from reaching the ground immediately adjacent to the buildings. Downspouts extending from roof gutters should be equipped with extensions at ground level that are sloped to emit collected rainwater not less than 6 ft away from the buildings. The downspouts could be connected to solid discharge pipes buried beneath the ground. We caution that these pipes should be flexible enough to accommodate some differential movement and all pipe connections must be leak free.

Final grades around the buildings should provide rapid and effective drainage of rainwater and downspout water away from the buildings, with no areas allowed for water to pond. Underground sources of water such as leaking water lines, sewer lines, etc., should be prevented as much as possible in the initial construction, and any leaks that develop should be promptly repaired.

The site for the new buildings at West Jones High School in Jones County, Mississippi lies within a relatively low seismic activity region according to the seismic zone mapping referenced in the International Building Code. Given the site soil profile as revealed by the borings and anticipated for the area based on our experience, a site class D could be used in a seismic load evaluation.

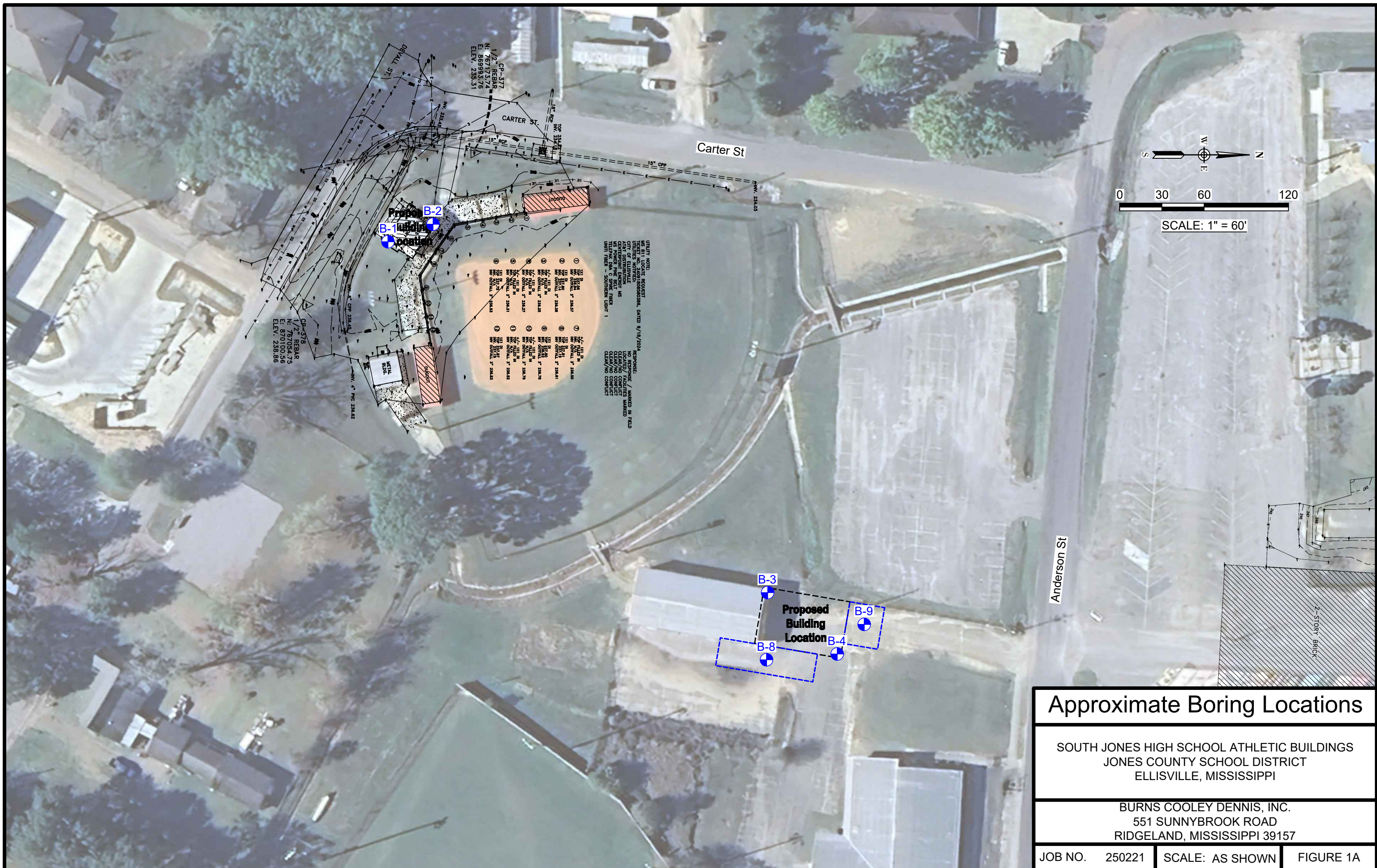
7.0 REPORT LIMITATIONS

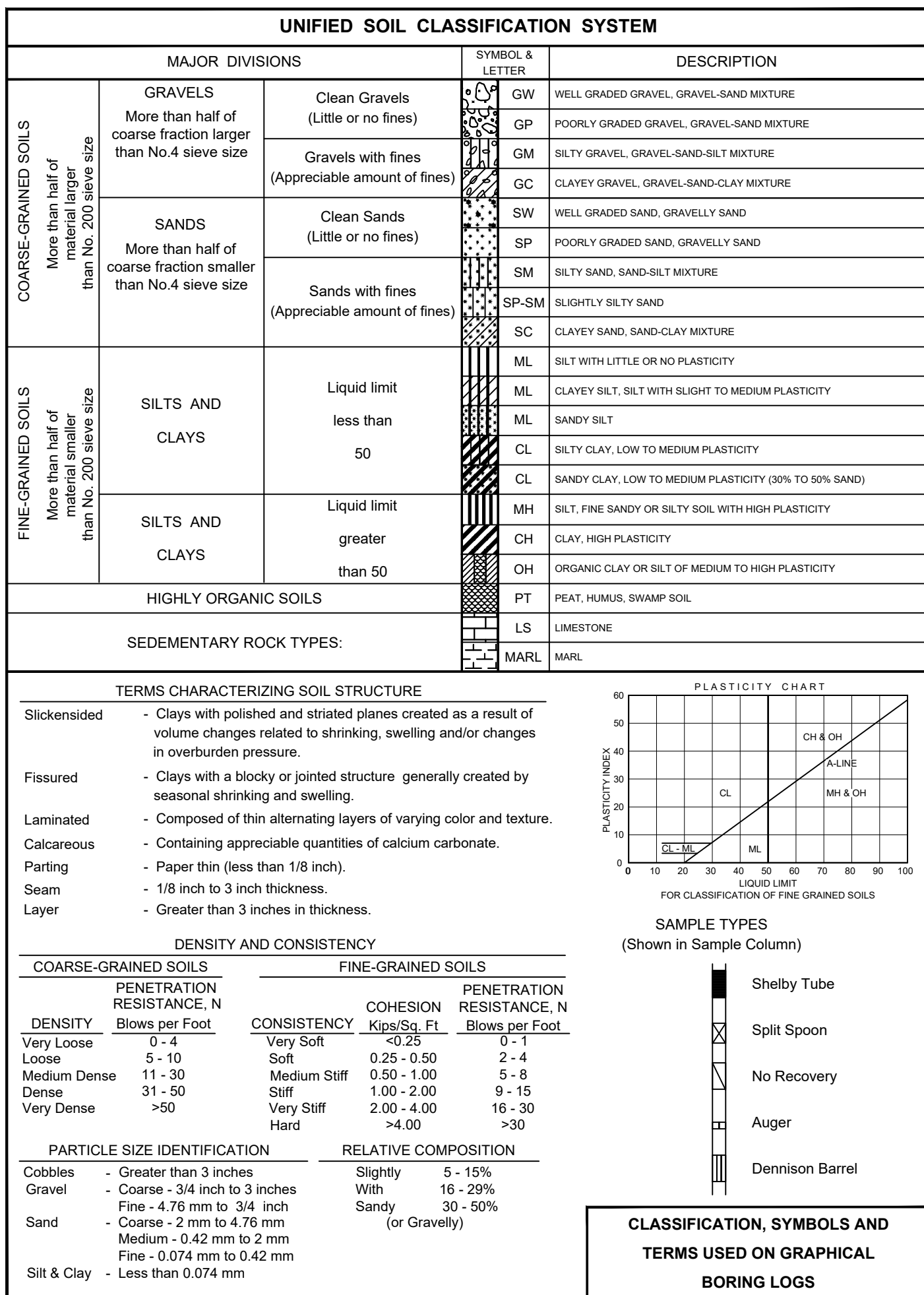
The analyses, conclusions, and recommendations discussed in this report are based on conditions as they existed at the time of our field exploration and further on the assumption that the exploratory borings are representative of subsurface conditions throughout the areas explored. It should be noted that actual subsurface conditions between and beyond the borings might differ from those encountered at the boring locations. If subsurface conditions are encountered during construction that vary from those discussed in this report, Burns Cooley Dennis, Inc. should be notified immediately in order that we may evaluate the effects, if any, on earthwork, foundation and pavement design and construction.

Burns Cooley Dennis, Inc. should be retained for a general review of final design drawings and specifications. It is advised that we be retained to observe earthwork, foundation and pavement construction for the project in order to help confirm that our recommendations are valid or to modify them accordingly. Burns Cooley Dennis, Inc. cannot assume responsibility or liability for the adequacy of recommendations if we do not observe construction.

This report has been prepared for the exclusive use of PryorMorrow PC for specific application to the geotechnical-related aspects of design and construction for three new athletic buildings at South Jones High School located at 313 Anderson Street in Ellisville, Mississippi. The only warranty made by us in connection with the services provided is we have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of our profession practicing in the same or similar locality. No other warranty, express or implied, is made or intended.

FIGURES





LOG OF BORING NO. 1

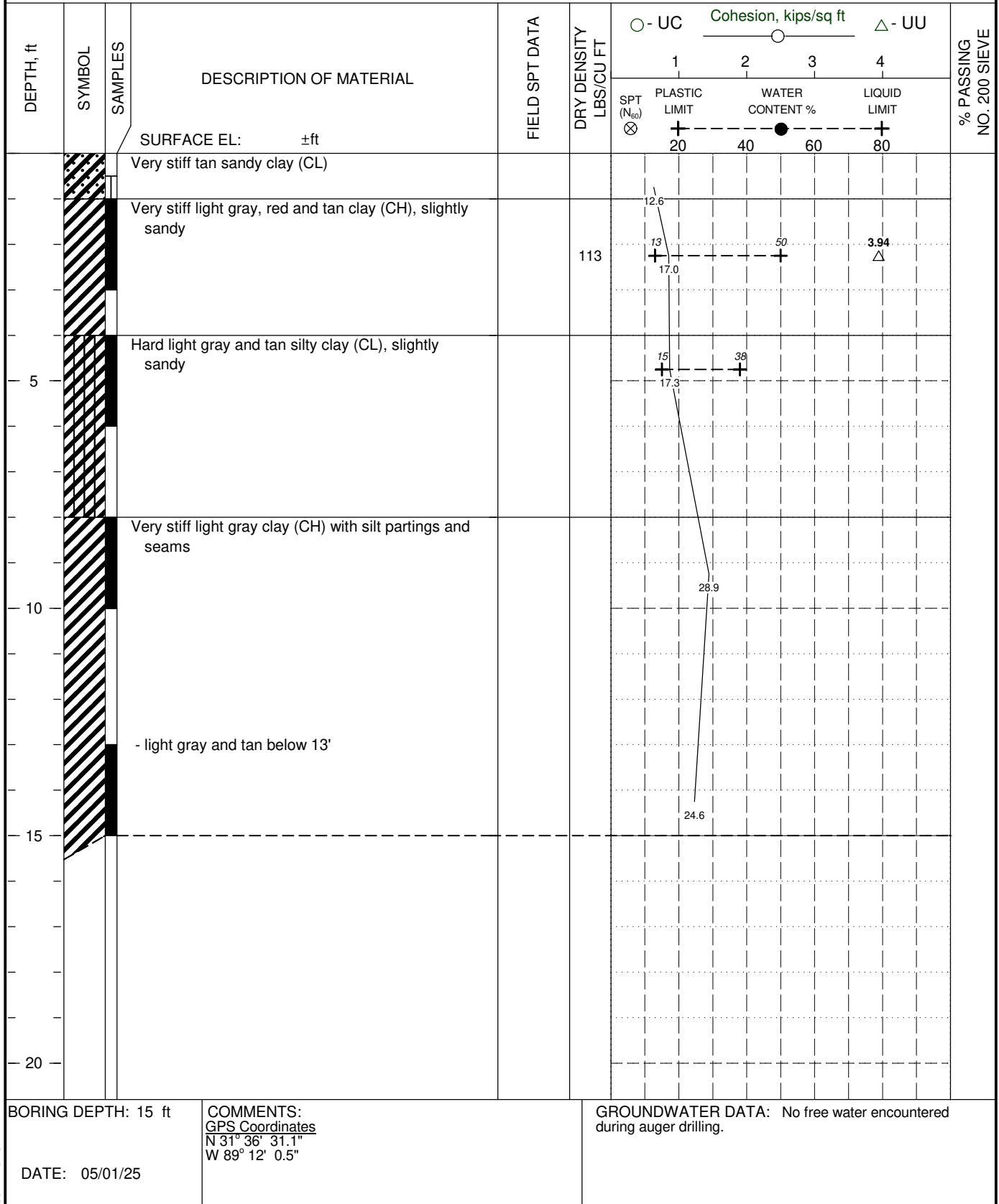
PROPOSED ADDITIONS

SOUTH JONES HIGH SCHOOL

JONES COUNTY, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1



250221.GPJ

LOG OF BORING NO. 2

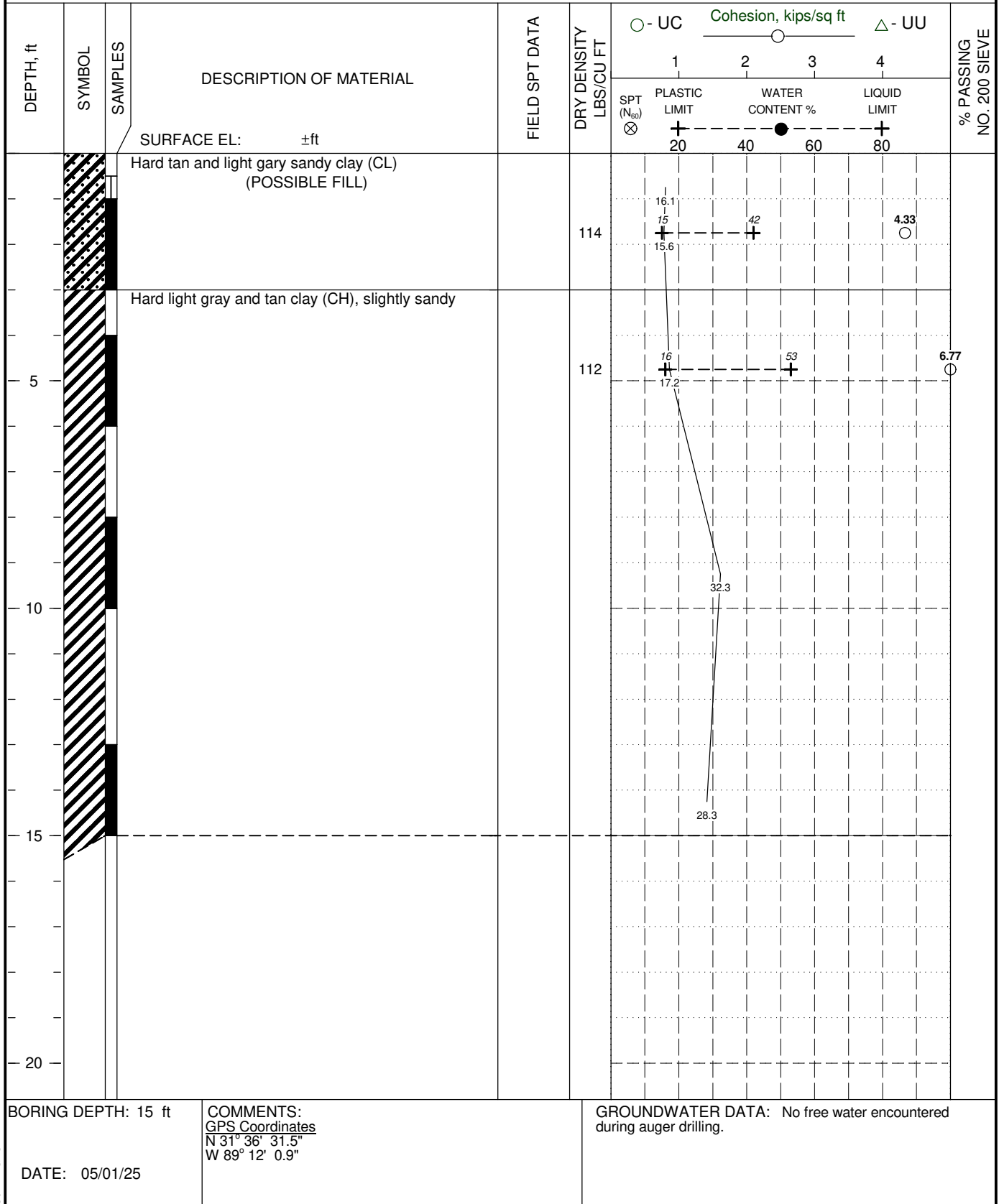
PROPOSED ADDITIONS

SOUTH JONES HIGH SCHOOL

JONES COUNTY, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1



250221.GPJ

LOG OF BORING NO. 3

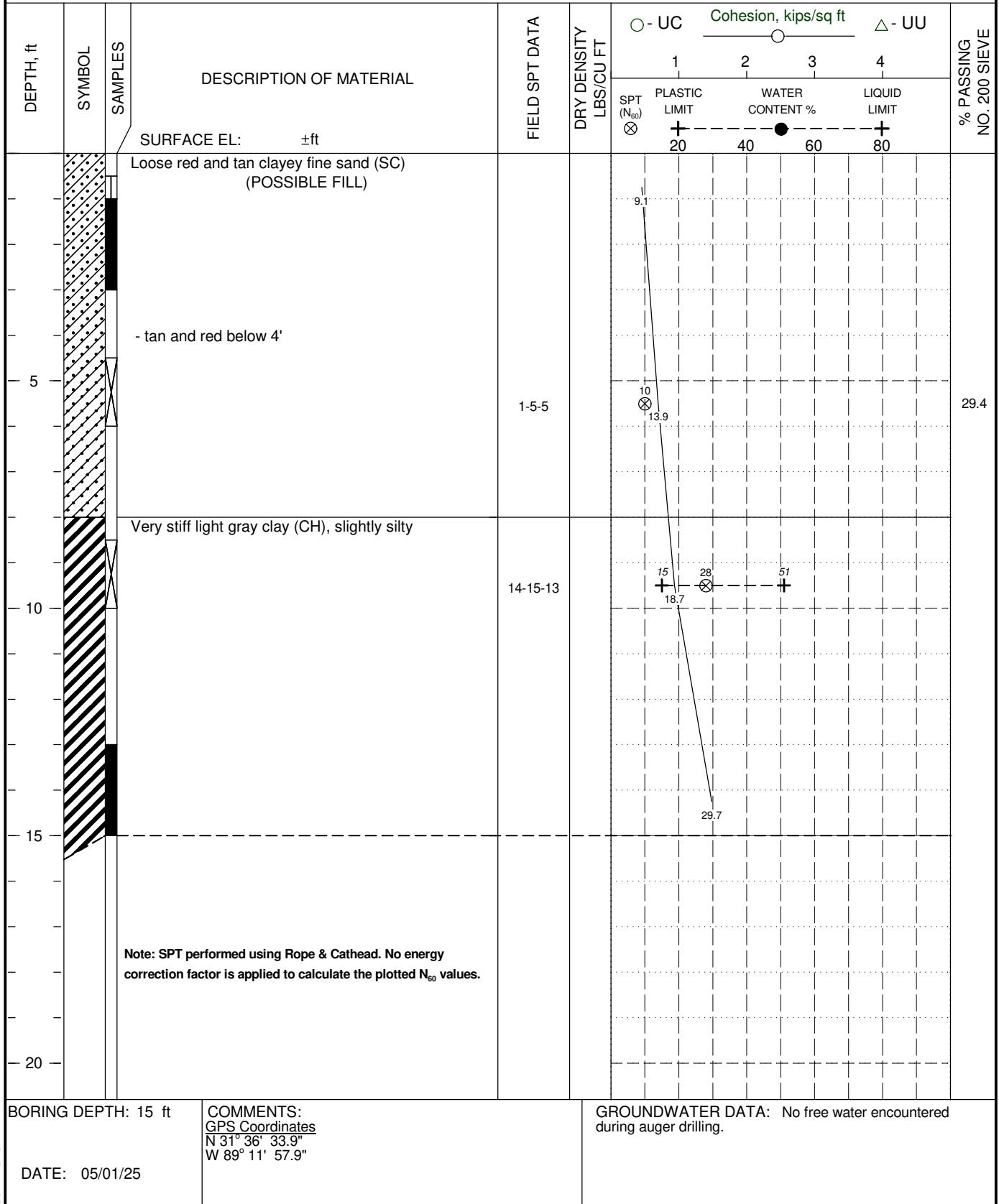
PROPOSED ADDITIONS

SOUTH JONES HIGH SCHOOL

JONES COUNTY, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1



250221.GPJ

LOG OF BORING NO. 4
PROPOSED ADDITIONS
SOUTH JONES HIGH SCHOOL
JONES COUNTY, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1

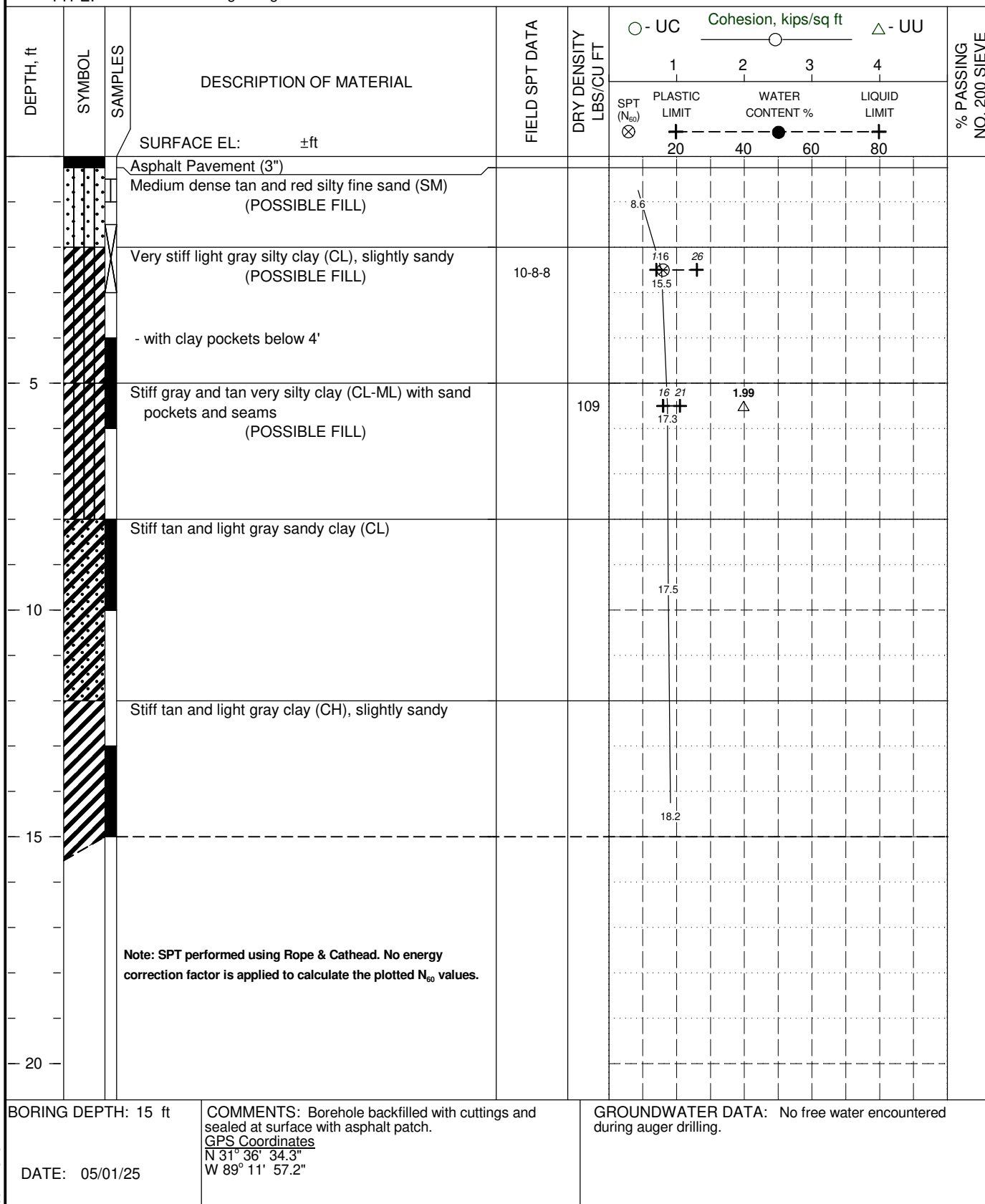


FIGURE 6

LOG OF BORING NO. 5

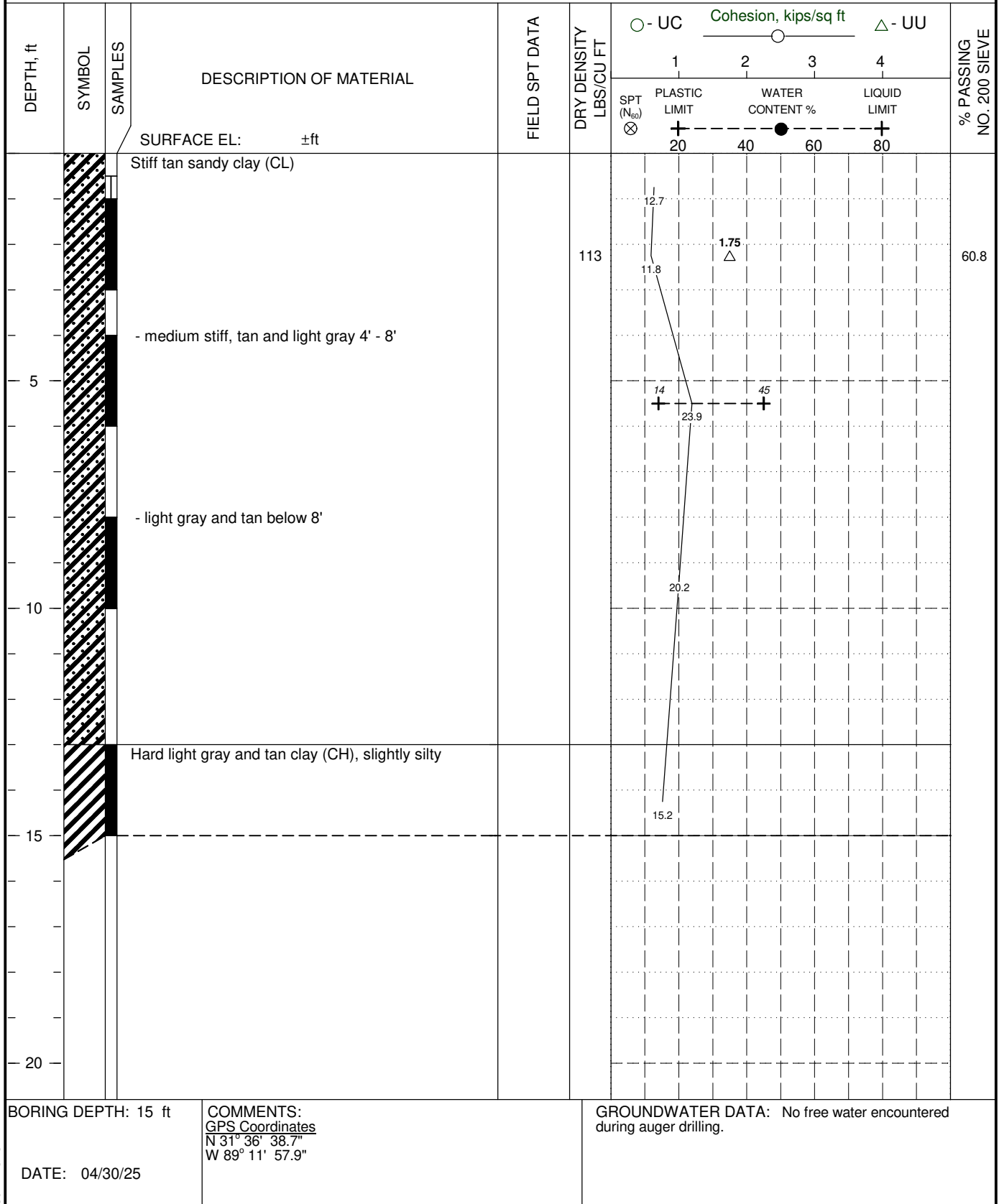
PROPOSED ADDITIONS

SOUTH JONES HIGH SCHOOL

JONES COUNTY, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1



250221.GPJ

LOG OF BORING NO. 7
PROPOSED ADDITIONS
SOUTH JONES HIGH SCHOOL
JONES COUNTY, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1

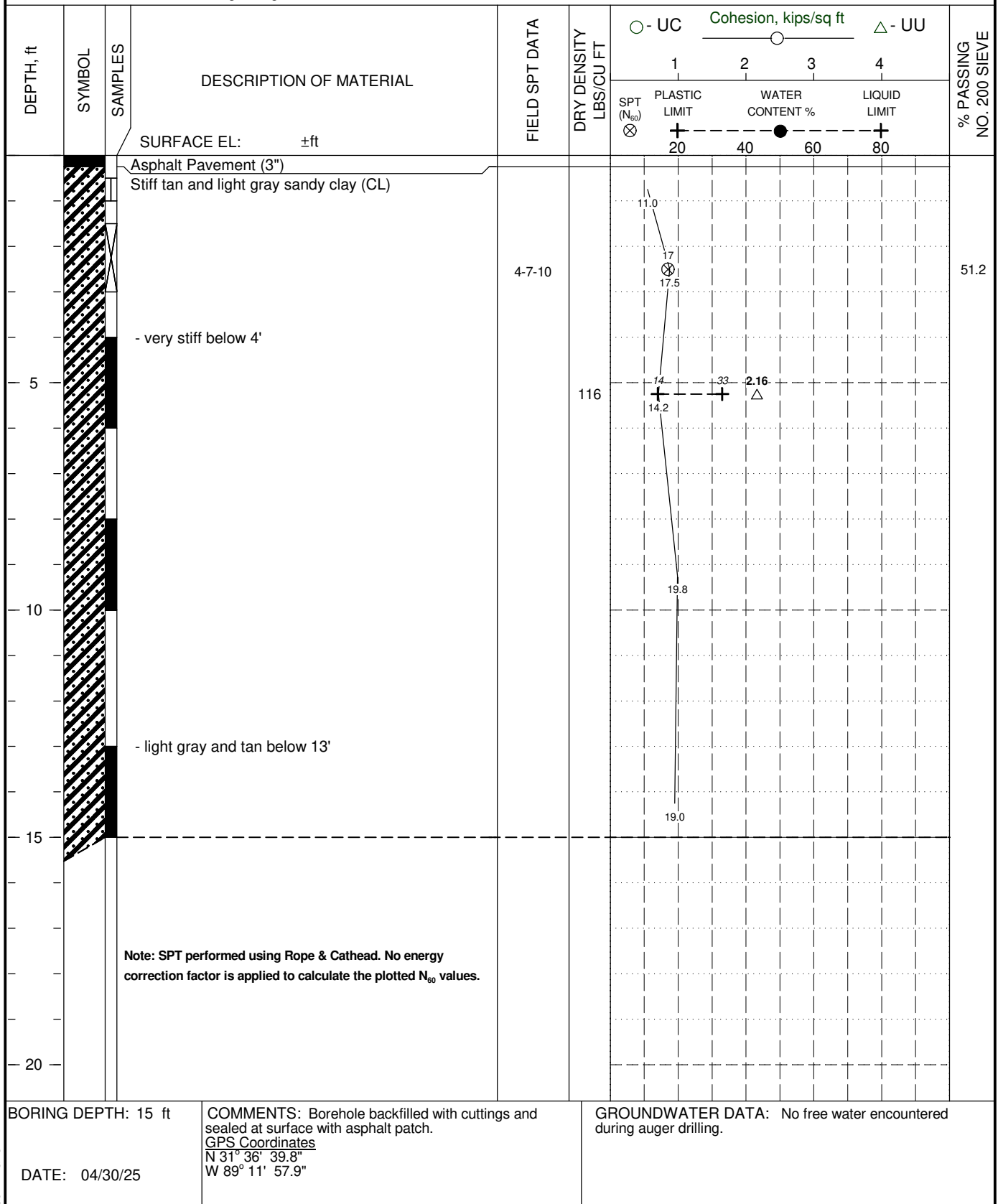


FIGURE 9

LOG OF BORING NO. 8
PROPOSED ADDITIONS
SOUTH JONES HIGH SCHOOL
JONES COUNTY, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1

[illegible]

250221.GPJ

FIGURE 10

LOG OF BORING NO. 9
PROPOSED ADDITIONS
SOUTH JONES HIGH SCHOOL
JONES COUNTY, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1

DEPTH, ft	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	FIELD SPT DATA	DRY DENSITY LBS/CU FT	○ - UC Cohesion, kips/sq ft △ - UU				% PASSING NO. 200 SIEVE
						1	2	3	4	
						SPT (N₆₀) ⊗	PLASTIC LIMIT +	WATER CONTENT % ●	LIQUID LIMIT +	
SURFACE EL: ±ft						20	40	60	80	
			Asphalt Pavement (3")							
			Loose red clayey fine sand (SC) (POSSIBLE FILL)			10.4				
			Loose tan silty fine sand (SM) with trace of gravel			10.8				
5						11.0				12.8
10										

BORING DEPTH: 6 ft

COMMENTS: Borehole backfilled with cuttings and sealed at surface with asphalt patch.

GPS Coordinates

N 31° 36' 28.2"

W 89° 11' 56.3"

GROUNDWATER DATA: No free water encountered during auger drilling.

DATE: 05/01/25

FIGURE 11

LOG OF BORING NO. 10

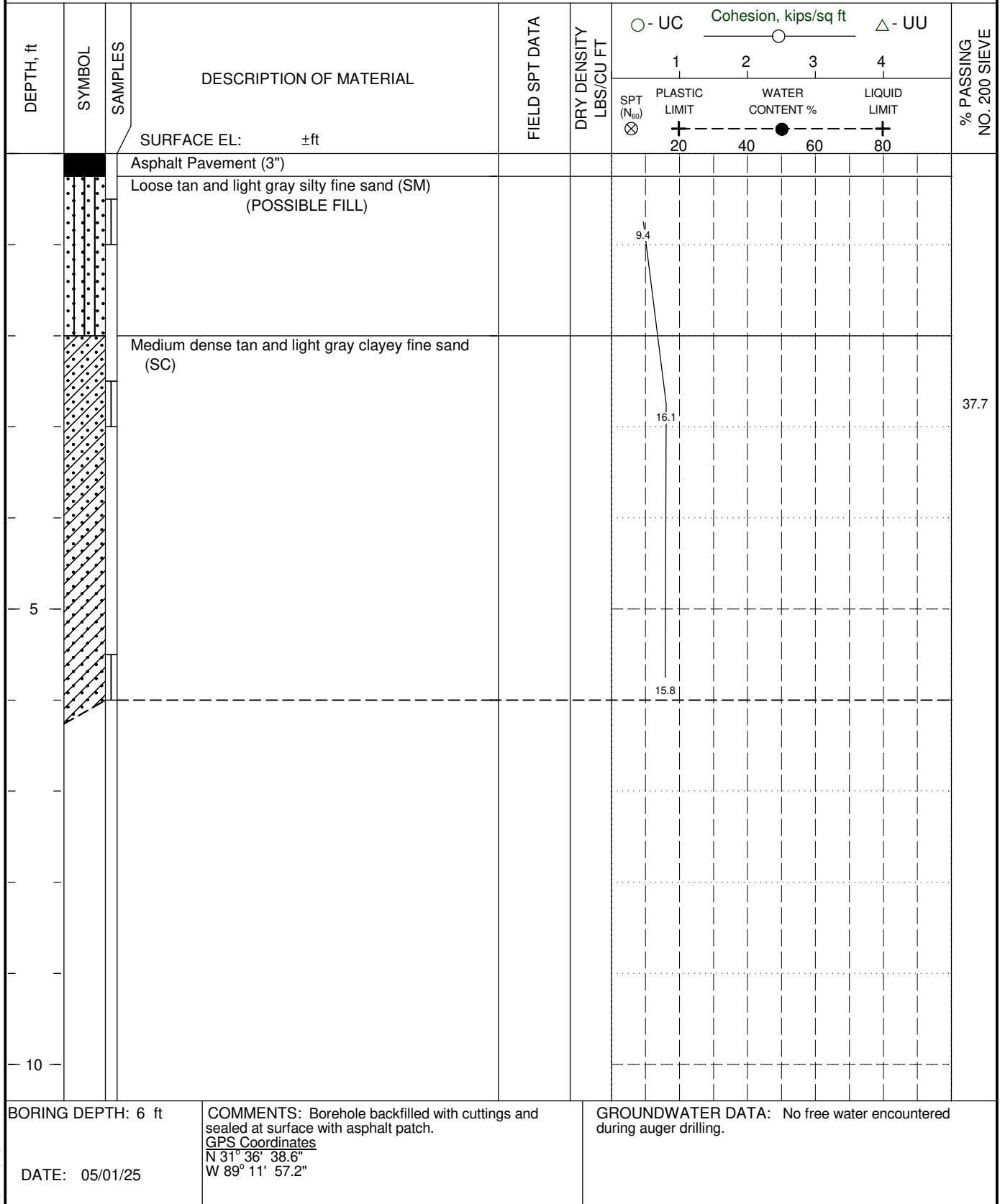
PROPOSED ADDITIONS

SOUTH JONES HIGH SCHOOL

JONES COUNTY, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1



250221.GPJ

LOG OF BORING NO. 11
PROPOSED ADDITIONS
SOUTH JONES HIGH SCHOOL
JONES COUNTY, MISSISSIPPI

TYPE: 4" Continuous-flight auger

LOCATION: See Figure 1

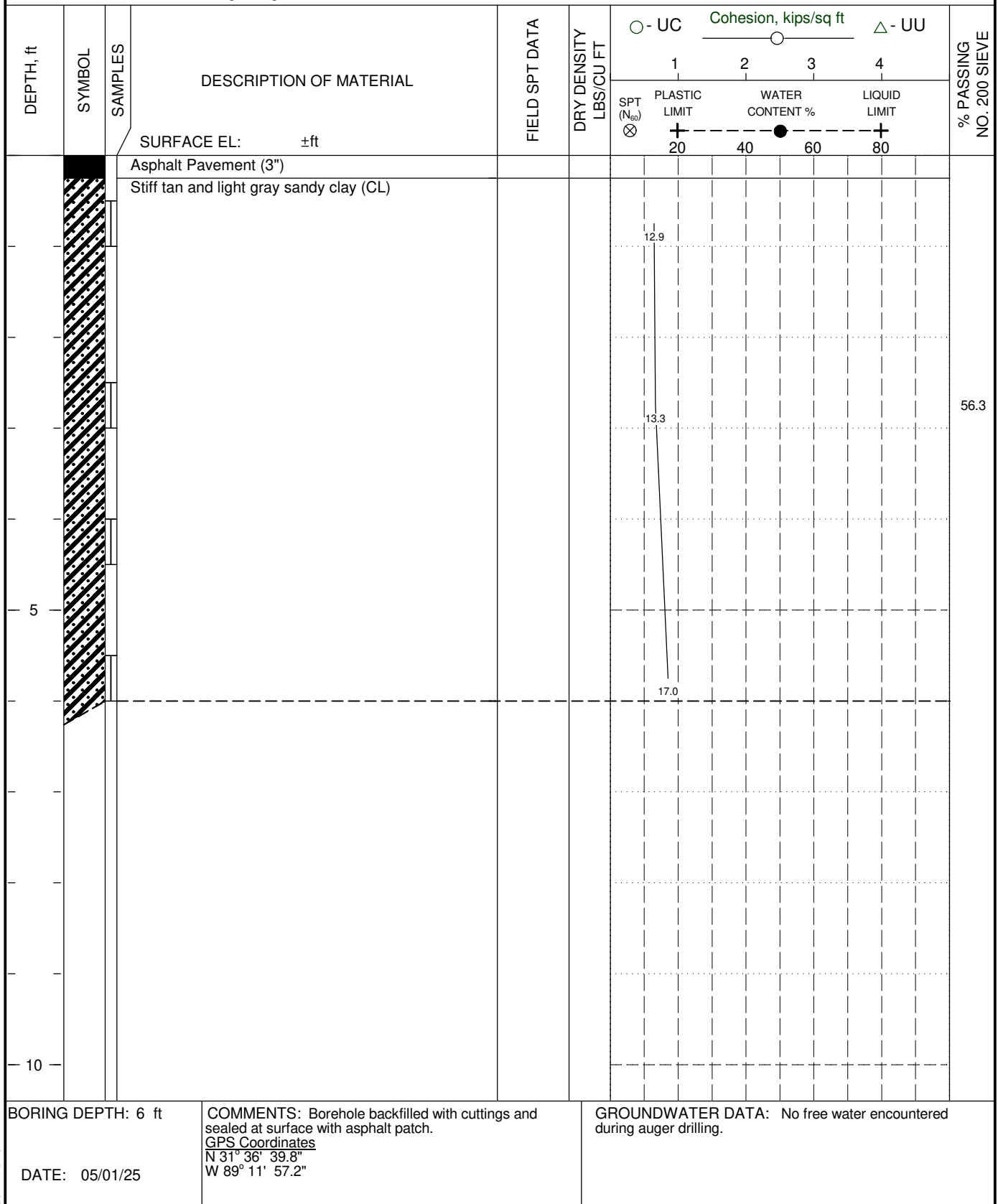
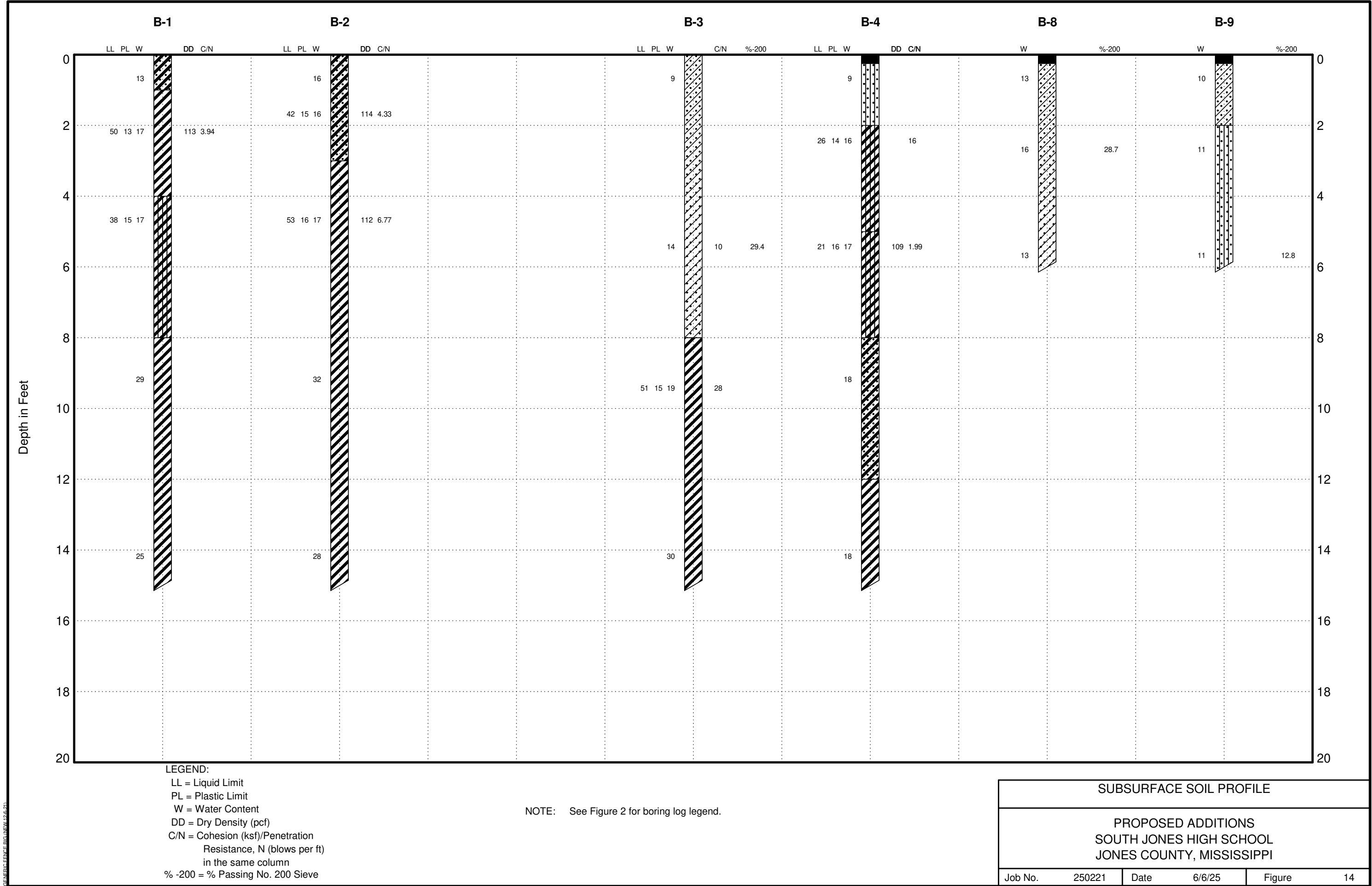
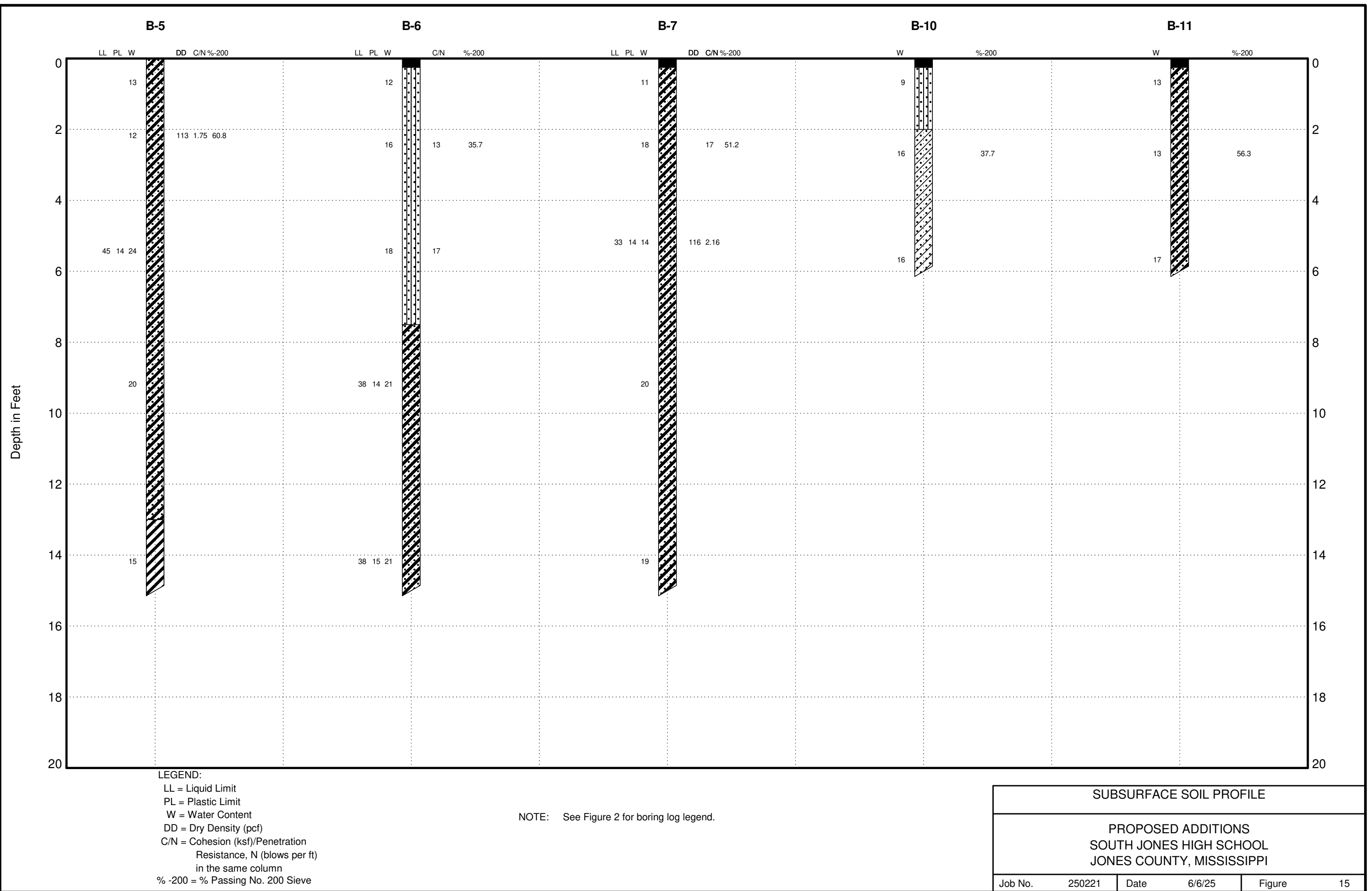


FIGURE 13





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SECTION 00 41 00
BID FORM

Date: _____ **Certificate of Responsibility Number:** _____

Proposal of: _____

Project:	2024922	Owner:	Jones County School District
	South Jones High School		5204 Highway 11 North
	Athletic Buildings		Ellisville, MS 39437
	Ellisville, Mississippi		

The receipt of the following Addenda to the Contract Documents is hereby acknowledged:

Addendum No. ____	Date _____	Pages: ____	Addendum No. ____	Date _____	Pages: ____
Addendum No. ____	Date _____	Pages: ____	Addendum No. ____	Date _____	Pages: ____

Having carefully examined the Contract Documents entitled South Jones High School Athletic Buildings, prepared by PryorMorrow PC, and dated June 25, 2025, as well as the premises and conditions affecting the work, the undersigned proposes to furnish all labor, materials, and services required by the Contract Documents for the work described as follows:

Bidder shall indicate “Deduct” or “Add” for alternates by crossing out the non-applicable term.

BASE BID:

_____ DOLLARS (\$ _____)

ALTERNATE #1: Softball-Soccer Field House size increase by 16’-0”.

_____ DOLLARS (\$ _____)

ALTERNATE #2: Tectum Clouds at Weight Room Ceiling (TYPE V)

_____ DOLLARS (\$ _____)

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Unit Price #1: The Contractor shall provide a unit price for additional concrete sidewalks. This shall be a per s.f. cost as an additive or deductive cost associated with the base. (Note: All concrete sidewalks shown on the drawings shall be included in the base bid).

DOLLARS (\$ _____)

Unit Price #2: (The Contractor shall provide a unit price for excavation and fill). This shall be per c.y. cost as an additive or deductive cost associated with the base. (refer to drawings for volume/quantity to be included in the base bid).

DOLLARS (\$ _____)

The OWNER and the CONTRACTOR recognize that time is of the essence in this Agreement and that the OWNER will suffer financial loss if the project is not substantially completed **as follows:**

Soccer-Volleyball Field House on or before May 15, 2026.

Softball Fieldhouse on or before July 24, 2026.

Softball Pressbox on or before December 11, 2026.

They also recognize the delays, expenses and difficulties involved in proving in a legal arbitration preceding the actual loss suffered by the OWNER if the Work is not substantially complete on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) the Owner will deduct the sum of **\$500.00 for each calendar day** that expires after the time specified above.

The Contractor represents that it has (1) examined all available records and data furnished by the Owner and the Architect and has from such examination informed itself fully concerning all surface conditions in connection with the work and the services to be performed hereunder, (2) determined that the site of the work is satisfactory in all respects for the work, and (3) read the Contract Documents and is fully cognizant of and is familiar with all of the terms and conditions thereof.

Respectfully Submitted:

Signed: _____

Print Name: _____

Title: _____

Address: _____

*If the bidder is a corporation, write State of Incorporated under signature. If the bidder is a partnership, show the names of all partners.

Note: The bidder's Certificate of Responsibility number is required on the outside of the envelope that contains the proposal of the bidder.

END OF SECTION

South Jones High School
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SECTION 00 52 00

AGREEMENT

PART 1 - GENERAL

1.01 CONTRACT

- A. Work to be executed under a single fixed-price contract, Standard Form of Agreement Between Owner and Contractor, AIA Document A101, 2017 Edition.
- B. A copy of the Agreement is available at the Architect's office for the Contractor's examination. The Agreement is incorporated by reference as though fully written herein.
- C. Prospective bidders should read and understand the Agreement form before submitting bids or executing the Agreement.

END OF SECTION

SECTION 00 61 00
INSURANCE AND BONDS

PART 1 - GENERAL

1.01 INSURANCE

- A. The Contractor is responsible for maintaining the following insurance coverage:
 - 1. Builder's Risk for the Amount of the Contract.
 - 2. Liability Insurance (see Section 00 73 00 – Supplementary Conditions).
 - 3. Workmen's Compensation.

1.02 SECURITY FOR FAITHFUL PERFORMANCE

- A. A Performance Bond and a Payment (Labor and Material) Bond are required as a condition of this Contract.
- B. Simultaneous with delivery of the executed contract, the Contractor shall furnish a surety bond or bonds as security for the faithful performance of this Contract and for the payment of all persons performing labor on the project under this Contract and furnishing materials in connection with this Contract in the amount of 100% of the contract sum for payment, executed on AIA Document A312.
- C. The surety on such bond or bonds will be a duly authorized surety company who is licensed by the State of Mississippi's Commissioner of Insurance and who has a B++ or higher rating in accordance with the most recent edition of the A.M. Best Company, Inc., Key Rating Guide.
- D. All bonds shall be countersigned by a Mississippi resident agent with the name and address typed or lettered legibly.
- E. All bonds must be accompanied by an appropriate Power of Attorney.

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DRAFT AIA® Document A101® – 2017
Exhibit A

Insurance and Bonds

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated the « » day of « » in the year « »
(In words, indicate day, month and year.)

for the following **PROJECT**:
(Name and location or address)

THE OWNER:
(Name, legal status and address)

THE CONTRACTOR:
(Name, legal status and address)

TABLE OF ARTICLES

- A.1 GENERAL**
- A.2 OWNER'S INSURANCE**
- A.3 CONTRACTOR'S INSURANCE AND BONDS**
- A.4 SPECIAL TERMS AND CONDITIONS**

ARTICLE A.1 GENERAL

The Owner and Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A201™-2017, General Conditions of the Contract for Construction.

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.

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 Document A201®-2017, General Conditions of the Contract for Construction. Article 11 of A201®-2017 contains additional insurance provisions.

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ARTICLE A.2 OWNER'S INSURANCE

§ A.2.1 General

Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Article A.2 and, upon the Contractor's request, provide a copy of the property insurance policy or policies required by Section A.2.3. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

§ A.2.2 Liability Insurance

~~The Owner shall be responsible for purchasing and maintaining the Owner's usual general liability insurance. The Contractor will pay for and maintain such insurance as will protect the Owner and Architect from their contingent liability to others for damages because of bodily injury, including death, which may arise from operations under this Contract and other liability for damages which the Contractor is required to insure under any provision of this Contract. Certificate of this insurance shall be filed with the Owner and Architect and will be the same limits set forth in this Exhibit A, Article A.3.2.2.~~

§ A.2.3 Required Property Insurance

~~§ A.2.3.1 Unless this obligation is placed on the Contractor pursuant to Section A.3.3.2.1, the Owner~~
The Contractor shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The ~~Owner's~~ Contractor's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed and materials or equipment supplied by others. The property insurance shall be maintained until ~~Substantial Completion and thereafter as provided in Section A.2.3.1.2, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement~~ final payment has been made as provided in Article 9.10 of the AIA A201-2017 or until no person or entity other than the Owner has an insurable interest in the property required by this Section A.2.3 to be covered, whichever is later. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.

§ A.2.3.1.1 Causes of Loss. The insurance required by this Section A.2.3.1 shall provide coverage for direct physical loss or damage, and shall not exclude the risks of fire, explosion, theft, vandalism, malicious mischief, collapse, earthquake, flood, or windstorm. The insurance shall also provide coverage for ensuing loss or resulting damage from error, omission, or deficiency in construction methods, design, specifications, workmanship, or materials. Sub-limits, if any, are as follows:

(Indicate below the cause of loss and any applicable sub-limit.)

Causes of Loss	Sub-Limit

§ A.2.3.1.2 Specific Required Coverages. The insurance required by this Section A.2.3.1 shall provide coverage for loss or damage to falsework and other temporary structures, and to building systems from testing and startup. The insurance shall also cover debris removal, including demolition occasioned by enforcement of any applicable legal requirements, and reasonable compensation for the Architect's and Contractor's services and expenses required as a result of such insured loss, including claim preparation expenses. Sub-limits, if any, are as follows:

(Indicate below type of coverage and any applicable sub-limit for specific required coverages.)

Coverage	Sub-Limit

§ A.2.3.1.3 ~~Unless the parties agree otherwise, upon Substantial Completion, the Owner~~ The Contractor shall continue the insurance required by Section A.2.3.1 or, if necessary, replace the insurance policy required under Section A.2.3.1 with property insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 12.2.2 of the General Conditions.

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§ A.2.3.1.4 Deductibles and Self-Insured Retentions. ~~If the insurance required by this Section A.2.3 is subject to deductibles or self-insured retentions, the Owner shall be responsible for all loss not covered because of such deductibles or retentions. If the property insurance requires minimum deductibles, the Contractor shall pay the deductible and all other costs not covered because of such deductibles. If the Contractor or insurer increases the required minimum deductibles above the amounts so identified or if the Contractor elects to purchase this insurance with voluntary deductible amounts, the Contractor shall be responsible for payment of the additional costs not covered because of such increased or voluntary deductible amounts.~~

§ A.2.3.1.5 ~~The insurance required by this Section A.2.3.1 shall provide coverage for physical damage to property while it is in storage and in transit to the construction site on an "all risk" completed value form.~~

§ A.2.3.1.6 ~~The insurance required by this Section A.2.3.1 shall provide coverage for property owned by the Contractor and used on the Project, including scaffolding and other equipment.~~

§ A.2.3.2 Occupancy or Use Prior to Substantial Completion. The Owner's occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section A.2.3.1 have consented in writing to the continuance of coverage. The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

§ A.2.3.3 Insurance for Existing Structures

If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Owner shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, "all-risks" property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage from the causes of loss identified in Section A.2.3.1, notwithstanding the undertaking of the Work. The Owner shall be responsible for all co-insurance penalties.

§ A.2.4 Optional Extended Property Insurance.

The Owner shall purchase and maintain the insurance selected and described below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. For each type of insurance selected, indicate applicable limits of coverage or other conditions in the fill point below the selected item.)

- ☐ **§ A.2.4.1 Loss of Use, Business Interruption, and Delay in Completion Insurance,** to reimburse the Owner for loss of use of the Owner's property, or the inability to conduct normal operations due to a covered cause of loss.

☐

- ☐ **§ A.2.4.2 Ordinance or Law Insurance,** for the reasonable and necessary costs to satisfy the minimum requirements of the enforcement of any law or ordinance regulating the demolition, construction, repair, replacement or use of the Project.

☐

- ☐ **§ A.2.4.3 Expediting Cost Insurance,** for the reasonable and necessary costs for the temporary repair of damage to insured property, and to expedite the permanent repair or replacement of the damaged property.

☐

- ☐ **§ A.2.4.4 Extra Expense Insurance,** to provide reimbursement of the reasonable and necessary excess costs incurred during the period of restoration or repair of the damaged property that are over and

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above the total costs that would normally have been incurred during the same period of time had no loss or damage occurred.

« »

- [« »] **§ A.2.4.5 Civil Authority Insurance.** for losses or costs arising from an order of a civil authority prohibiting access to the Project, provided such order is the direct result of physical damage covered under the required property insurance.

« »

- [« »] **§ A.2.4.6 Ingress/Egress Insurance.** for loss due to the necessary interruption of the insured's business due to physical prevention of ingress to, or egress from, the Project as a direct result of physical damage.

« »

- [« »] **§ A.2.4.7 Soft Costs Insurance.** to reimburse the Owner for costs due to the delay of completion of the Work, arising out of physical loss or damage covered by the required property insurance; including construction loan fees; leasing and marketing expenses; additional fees, including those of architects, engineers, consultants, attorneys and accountants, needed for the completion of the construction, repairs, or reconstruction; and carrying costs such as property taxes, building permits, additional interest on loans, realty taxes, and insurance premiums over and above normal expenses.

« »

§ A.2.5 Other Optional Insurance.

The Owner shall purchase and maintain the insurance selected below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance.)

- [« »] **§ A.2.5.1 Cyber Security Insurance** for loss to the Owner due to data security and privacy breach, including costs of investigating a potential or actual breach of confidential or private information.
(Indicate applicable limits of coverage or other conditions in the fill point below.)

« »

- [« »] **§ A.2.5.2 Other Insurance**
(List below any other insurance coverage to be provided by the Owner and any applicable limits.)

Coverage

Limits

ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS

§ A.3.1 General

§ A.3.1.1 Certificates of Insurance. The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies.

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§ A.3.1.2 Deductibles and Self-Insured Retentions. The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor.

§ A.3.1.3 Additional Insured Obligations. To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage to include (1) the Owner, the Architect, and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner and Architect as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, CG 20 32 07 04, and the Contractor's certificate of insurance must state that the Owner and Architect are additional insureds under the referenced CGL policy and that all of the Contractor's contractual liabilities, including but not limited to its indemnity obligations, are covered by such CGL policy.

Any language contained on the certificate of insurance form or elsewhere to the contrary is deemed stricken.

The certificate of insurance must also state that all of the Contractor's contractual liabilities, including but not limited to its indemnity obligations, are covered. Any terms and conditions contained in the certificate of insurance which are contrary to the Contractor's contractual obligations are hereby stricken from the certificate.

§ A.3.1.4 Furnish one copy of the certificate herein required for each copy of the agreement, specifically setting forth evidence of all coverage required. Furnish to the Owner and Architect, copies of any endorsements that are subsequently issued amending coverage or limits. If the coverages are provided on a claims-made basis, the policy date or retroactive date shall predate the Contract and the termination date of the policy, or the applicable extended reporting period shall be no earlier than the termination date of coverages required to be maintained after final payment.

§ A.3.2 Contractor's Required Insurance Coverage

§ A.3.2.1 The Contractor shall purchase and maintain the following types and limits of insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:
(If the Contractor is required to maintain insurance for a duration other than the expiration of the period for correction of Work, state the duration.)

« »

§ A.3.2.2 Commercial General Liability

§ A.3.2.2.1 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than « Five Hundred thousand dollars » (\$ « 500,000.00 ») each occurrence, « One Million dollars » (\$ « 1,000,000.00 ») general aggregate, and « One Million dollars » (\$ « 1,000,000.00 ») aggregate for products-completed operations hazard, providing coverage for claims including

- .1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;
- .2 personal injury and advertising injury;
- .3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;
- .4 bodily injury or property damage arising out of completed operations; and
- .5 the Contractor's indemnity obligations under Section 3.18 of the General Conditions.

§ A.3.2.2.2 The Contractor's Commercial General Liability policy under this Section A.3.2.2 shall not contain an exclusion or restriction of coverage for the following:

- .1 Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.

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- .2 Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.
- .3 Claims for bodily injury other than to employees of the insured.
- .4 Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees of the insured.
- .5 Claims or loss excluded under a prior work endorsement or other similar exclusionary language.
- .6 Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.
- .7 Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.
- .8 Claims related to roofing, if the Work involves roofing.
- .9 Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.
- .10 Claims related to earth subsidence or movement, where the Work involves such hazards.
- .11 Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

§ A.3.2.3 Automobile Liability covering vehicles owned, and non-owned vehicles used, by the Contractor, with policy limits of not less than « Five Hundred dollars » (\$ « 500,000.00 ») per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage.

§ A.3.2.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as the coverages required under Section A.3.2.2 and A.3.2.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ A.3.2.5 Workers' Compensation at statutory limits.

§ A.3.2.6 Employers' Liability with policy limits not less than « One Hundred dollars » (\$ « 100,000.00 ») each accident, « One Hundred dollars » (\$ « 100,000.00 ») each employee, and « Five Hundred dollars » (\$ « 500,000.00 ») policy limit.

§ A.3.2.7 Jones Act, and the Longshore & Harbor Workers' Compensation Act, as required, if the Work involves hazards arising from work on or near navigable waterways, including vessels and docks

§ A.3.2.8 If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate.

§ A.3.2.9 If the Work involves the transport, dissemination, use, or release of pollutants, the Contractor shall procure Pollution Liability insurance, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate.

§ A.3.2.10 Coverage under Sections A.3.2.8 and A.3.2.9 may be procured through a Combined Professional Liability and Pollution Liability insurance policy, with combined policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate.

§ A.3.2.11 Insurance for maritime liability risks associated with the operation of a vessel, if the Work requires such activities, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate.

§ A.3.2.12 Insurance for the use or operation of manned or unmanned aircraft, if the Work requires such activities, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate.

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§ A.3.3 Contractor's Other Insurance Coverage

§ A.3.3.1 Insurance selected and described in this Section A.3.3 shall be purchased from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

(If the Contractor is required to maintain any of the types of insurance selected below for a duration other than the expiration of the period for correction of Work, state the duration.)

« »

§ A.3.3.2 The Contractor shall purchase and maintain the following types and limits of insurance in accordance with Section A.3.3.1.

(Select the types of insurance the Contractor is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. Where policy limits are provided, include the policy limit in the appropriate fill point.)

- [☐] **§ A.3.3.2.1** Property insurance of the same type and scope satisfying the requirements identified in Section A.2.3, which, if selected in this section A.3.3.2.1, relieves the Owner of the responsibility to purchase and maintain such insurance except insurance required by Section A.2.3.1.3 and Section A.2.3.3. The Contractor shall comply with all obligations of the Owner under Section A.2.3 except to the extent provided below. The Contractor shall disclose to the Owner the amount of any deductible, and the Owner shall be responsible for losses within the deductible. Upon request, the Contractor shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall adjust and settle the loss with the insurer and be the trustee of the proceeds of the property insurance in accordance with Article 11 of the General Conditions unless otherwise set forth below:
(Where the Contractor's obligation to provide property insurance differs from the Owner's obligations as described under Section A.2.3, indicate such differences in the space below. Additionally, if a party other than the Owner will be responsible for adjusting and settling a loss with the insurer and acting as the trustee of the proceeds of property insurance in accordance with Article 11 of the General Conditions, indicate the responsible party below.)

« »

- [☐] **§ A.3.3.2.2 Railroad Protective Liability Insurance**, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate, for Work within fifty (50) feet of railroad property.
- [☐] **§ A.3.3.2.3 Asbestos Abatement Liability Insurance**, with policy limits of not less than « » (\$ « ») per claim and « » (\$ « ») in the aggregate, for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos-containing materials.
- [☐] **§ A.3.3.2.4** Insurance for physical damage to property while it is in storage and in transit to the construction site on an "all-risks" completed value form.
- [☐] **§ A.3.3.2.5** Property insurance on an "all-risks" completed value form, covering property owned by the Contractor and used on the Project, including scaffolding and other equipment.
- [☐] **§ A.3.3.2.6 Other Insurance**
(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)

Coverage

Owners/Contractors Protective Liability
Builders Risk

Limits

\$1,000,000.00
Amount of the Construction Contract

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§ A.3.4 Performance Bond and Payment Bond

The Contractor shall provide surety bonds, from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located, as follows:
(Specify type and penal sum of bonds.)

Type	Penal Sum (\$0.00)
Payment Bond	<u>Amount of the Construction Contract</u>
Performance Bond	<u>Amount of the Construction Contract</u>

Payment and Performance Bonds shall be AIA Document A312™, Payment Bond and Performance Bond, or contain provisions identical to AIA Document A312™, current as of the date of this Agreement.

ARTICLE A.4 SPECIAL TERMS AND CONDITIONS

Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:

« »

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END OF SECTION

SECTION 00 72 00
GENERAL CONDITIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. The General Conditions of the Contract for Construction is AIA Document A201-2017 Edition.
 - 1. See Section 00 73 00 for supplementary conditions.
- B. If a conflict exists between the General Conditions and the Specifications, the Specifications shall rule. Any party discovering a conflict between the Specifications and the General Conditions shall immediately notify the Architect in writing.
- C. A copy of the General Conditions is available at the Architect's office for the Contractor's examination. The General Conditions are incorporated by reference as though fully written herein.
- D. Prospective bidders should read and understand the General Conditions before submitting bids or executing the Agreement.

END OF SECTION

SECTION 00 73 00
SUPPLEMENTAL CONDITIONS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The following Supplemental Conditions modify the “General Conditions of the Contract for Construction,” AIA Document A201-2017 Edition. Where a portion of the General Conditions is modified or deleted by the Supplemental Conditions, the unaltered portions of the General Conditions shall remain in effect. In the event of a conflict between the General Conditions of the Contract for Construction and Section 00 73 00, Section 00 73 00 shall control even if the conflicting provisions in the General Conditions of the Contract for Construction is not expressly revised or deleted by reference in Section 00 73 00.
- B. The General Conditions may also be supplemental or amplified elsewhere in the Contract Documents by provisions located in, but not necessarily limited to, Division 1 of the Specifications.

1.02 SUPPLEMENTS

ARTICLE 1 – GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

1.1.1 THE CONTRACT DOCUMENTS

Delete the last sentence in Article 1.1.1 and insert the following:

The Contract Documents shall include Instruction to Bidders, the plans, the specifications, including Division 0 through 48, all Addenda and modifications to the plans and/or specifications, the agreement between Owner and Contractor, the performance and payment bonds, the notice to proceed and any executed Change Orders. Information and documentation pertaining to soil investigation data, laboratory investigation, soil borings and related information included herein are not part of the Contract Documents. In the event of a conflict between the provisions of Division 0 and any other section of the Contract Documents, such other section(s) shall govern.

1.1.2 THE CONTRACT

Add the following to the end of Article 1.1.2:

When there is a conflict between large scale drawings and small scale drawings, the question shall be promptly submitted to the Architect for interpretation, explanation or clarification. One drawing does not take precedent over another. Where the word “similar” appears on the plans, it shall not be interpreted to mean “identical” and shall require the Contractor to coordinate the actual conditions and dimensions of the location where “similar” conditions are shown to occur.

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1.1.9 MISCELLANEOUS DEFINITIONS

Add the following:

The term “products” as used in Supplementary Conditions includes materials, systems and equipment.

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

1.2.4 Add the following to Article 1.2.4:

It is the intent of the Contract Documents that the Contractor shall properly execute and complete the Work described by the Contract Documents, and unless otherwise provided in the Contract, the Contractor shall provide labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation and other facilities and services, whether temporary or permanent and whether or not incorporated in the Work, in full accordance with the Contract Documents and reasonably inferable from them as necessary to produce the intended results.

1.2.5 Add the following to Article 1.2.5:

The Contract Documents shall be interpreted collectively, each part complementing the others and consistent with the intent of the Contract Documents. Unless an item shown or described in the Contract Documents is specifically identified to be furnished or installed by the Owner or others or is identified as “Not In Contract” (“N.I.C.”), the Contractor’s obligation relative to that item shall be interpreted to include furnishing, assembling, installing finishing, and/or connecting the item at the Contractor’s expense to produce a product or system that is complete, appropriately tested, and in operable conditions ready for use or subsequent construction or operation by the Owner or separate contractors. The omission of words or phrases for brevity of the Contract Documents, the inadvertent omission of words or phrases, or obvious typographical or written errors shall not defeat such interpretation as long as it is reasonably inferable from the Contract Documents as a whole.

Except as noted otherwise, references to standard specifications or publications of associations, bureaus or organizations shall mean the latest edition of the referenced standard specifications or publications as of the date of the Advertisement for Bids.

In the case of 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’s interpretation.

Any doubt as to the meaning of the Contract Documents or any obscurity as to the wording of them, shall be promptly submitted in writing to the architect for written interpretation, explanation or clarification.

1.7 Delete Article 1.7 in its entirety

1.8 Delete Article 1.8 in its entirety

ARTICLE 2 – OWNER

2.2 EVIDENCE OF THE OWNER’S FINANCIAL ARRANGEMENTS

2.2.1 Add the following to Article 2.2.1:

If the Project is a private project, not funded by public funds, then...

2.2.2 Delete Article 2.2.2 in its entirety

2.3 INFORMATION AND SERVICES REQUIRED BY THE OWNER

2.3.1 Delete Article 2.3.1 in its entirety

2.3.2 Add the following at the end of Article 2.3.2:

NOTE: the term “Architect”, “Engineer” or “Design Professional” as used in the Contract Documents refers to PryorMorrow PC

2.3.4 Delete Article 2.3.4 in its entirety

2.3.6 Delete Article 2.3.6 in its entirety and insert the following:

The Contractor will be furnished free of charge a digital copy of the plans and specifications, including all addenda. Printed sets will be furnished at the cost of reproductions, postage and handling.

2.4 OWNER’S RIGHT TO STOP THE WORK

2.4 Delete Article 2.4 in its entirety and insert the following:

If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents as required by Article 12.2 or fails to carry out Work in accordance with the Contract Documents or fails to perform any of its obligations under 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 Article 6.1.3.

The rights and the remedies under this Article 2.4 are in addition to and do not in any respect limit any other rights of the Owner, including its termination rights under article 14.

ARTICLE 3 – CONTRACTOR

3.1 GENERAL

3.1.1 Add the following at the end of article 3.1.1:

The relationship of Contractor to Owner shall be that of independent contractor, and nothing in the Contract Documents is intended to nor should it be construed as creating any other relationship, expressed or implied, between Owner and Contractor.

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

3.2.5 Add the following Article 3.2.5:

The Owner is entitled to deduct from the Contractor's pay applications for amounts paid to the Architect for evaluating and responding to the Contractor's request for information that are not prepared in accordance with the Contract Documents or where the requested information is available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, or prior Project correspondence or documentation.

3.4 LABOR AND MATERIALS

3.4.2 Add the following to the end of Article 3.4.2:

Some Sections of the specifications may not allow substitutions of materials, products or equipment. Where substitutions of products in place of those specified only under the conditions set forth in Section 01 25 13 of the specifications.

By making request for substitutions, the Contractor:

- .1 Represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
- .2 Represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;
- .3 Certifies that the cost data presented is complete and includes all related cost under this Contract except the Architect's redesign cost, and waives all claims for additional cost related to the substitution which subsequently becomes apparent; and
- .4 Shall coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects at its cost.

All substitutions shall be submitted within 30 days of the Notice to Proceed, as per Section 01 25 13

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3.4.4 Add the following Article 3.4.4:

Contractor represents that it has independently investigated, considered and understands the labor conditions in the area surrounding the Project and acknowledge that such conditions may impact the Contractor's cost and/or time of performance of the Contract. Therefore, Contractor further represents that the Contract Price is based upon Contractor's independent investigations into such labor conditions and that the Contract time is reasonable and the date of Substantial Completion is obtainable. As a result, Contractor assumes the risk of increased cost, if any, incurred by it arising out of or related to such labor conditions and acknowledges that Contractor and its surety will reimburse Owner for any additional costs the Owner incurs arising out of or related to such labor condition.

3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

3.7.1 Delete Article 3.7.1 in its entirety and insert the following:

The Contractor shall secure and pay for the building permit and all other permits, fees, licenses, inspections and all other approvals and charges necessary for proper execution and completion of the Work.

3.7.3 Delete the words "knowing it to be" from Article 3.7.3

3.9 SUPERINTENDENT

3.9.1 Add the following to the end of Article 3.9.1

The Contractor shall also employ a competent project manager who shall be primarily responsible for the Contractor's home office activities in connection with the Contract.

The Owner shall have the right, which shall be exercised in a reasonable fashion, to approve the project manager and/or superintendent employed by the Contractor, either before or during the progress of construction.

The superintendent and project manager for the project shall be designated by the Contractor at the pre-construction conference. After Owner's approval of such project manager and superintendent, they shall not be replaced by the Contractor without the Owner's prior written consent, which consent is required unless the Contractor submits proof satisfactory to the Owner that the superintendent and/or project manager should be terminated by the Contractor for cause.

3.10 CONTRACTOR'S CONSTRUCTION AND SUBMITTAL SCHEDULES

3.10.1 Add "but, in any event, no less than submission of a revised schedule with each monthly application for payment pursuant to Section 9.3" between "intervals" and "as" in the fourth sentence.

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3.10.3 Delete Article 3.10.3 in its entirety and insert the following:

Time being of the essence, the Contractor shall perform the Work in accordance with the most recent schedule submitted to and approved by the Owner and Architect.

3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

3.12.6 Add the following to the end of Article 3.12.6:

In reviewing Shop Drawings, Product Data, Samples and similar submittals the Architect shall be entitled to rely upon the Contractor's representation that such information is correct and accurate.

3.12.8 Add the following to the end of Article 3.12.8:

Unless such written notice has been given, the Architect's approval of a Shop Drawing, Product Data, Sample or similar submittal shall not constitute approval of any changes not requested on the prior submittal.

3.12.9 Add the following to the end of Article 3.12.9:

The Architect's review of the Contractor's submittals will be limited to examination of an initial submittal and one (1) resubmittal. The Architect's review of additional submittals will be made only with the consent of the Owner after notification by the Architect. The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for evaluation of such additional submittals.

3.12.10.1 Delete the second sentence entirely and replace with the following:

The performance and design criteria specified by the Architect in the Contract Documents shall be prepared in accordance with the applicable standard of care.

3.18 INDEMNIFICATION

3.18.1 Add the word "defend" before the word "indemnify" in the first line, add the words "or nonperformance" after the word "performance" in the third line and delete the phrase which begins "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)," to the end of the sentence.

ARTICLE 4 – ARCHITECT

4.2 ADMINISTRATION OF THE CONTRACT

4.2.10 Delete Article 4.2.10 in its entirety

ARTICLE 5 – SUBCONTRACTORS

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

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- 5.2.1 Delete the phrase “Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract” from the first sentence of Article 5.2.1 and insert the following in lieu thereof:

“The Contractor, with its first Application for Payment and as a condition to the Owner’s obligation to make payments to Contractor under Article 9 of the General Conditions as supplemented herein.

- 5.2.5 Add the following:

The Contractor’s unauthorized substitutions of any subcontractor, supplier, person or entity previously identified by Contractor in accordance with Article 5.2.1 shall entitle the Owner to reject the work, materials or product furnished and require removal and replacement at no additional cost to the Owner.

ARTICLE 6 – CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

- 6.1 OWNERS RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

- 6.1.1 Delete Articles 6.1.1 in its entirety and insert the following:

The term “Separate Contractor(s)” shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner’s own forces and to award separate contracts either in connection with other portions of the Project or other construction or operation on the site. In such event, the Contractor shall coordinate its activities with those of the Owner and of separate contractors so as to facilitate the general progress of all work being performed by all parties. Cooperation will be required in the arrangement for the storage of materials, and in detailed execution of the Work.

The Contractor, including his subcontractors, shall keep informed of the progress and the detailed work of the Owner or separate contractors and shall immediately notify the Architect of lack of progress or delays by separate contractors which are affecting Contractor’s Work. Failure of Contractor to keep informed of the progress of the work of the Owner or other contractors and/or failure of Contractor to give notice of lack of progress or delays by the Owner or separate contractors shall be deemed to be acceptance by Contractor of the status of progress by other contractors for the proper coordination and completion of Contractor’s Work. If, through acts of neglect on the part of the Contractor, the Owner or any separate contractors or subcontractor shall suffer loss or damage or assert any claims of whatever nature against the Owner, the Contractor shall defend, indemnify and hold harmless the Owner from any such claims or alleged damages, and the Contractor shall resolve such alleged damages or claims directly with the separate contractors or subcontractors.

- 6.1.2 Delete Articles 6.1.2 in its entirety
- 6.1.3 Delete Articles 6.1.3 in its entirety
- 6.1.4 Delete Articles 6.1.4 in its entirety

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6.2 MUTUAL RESPONSIBILITY

6.2.3 Delete Article 6.2.3 in its entirety

ARTICLE 7 – CHANGES TO THE WORK

7.1 GENERAL

7.1.1 Add “Written” in front of “Change Order” on the second line.

7.1.2 Add in the last line between “Work” and “may” the words “not affecting time or money”

7.1.3 Add the following to the end of article 7.1.3:

Except as permitted in Article 7.3, a change in the Contract Time shall only be accomplished by written Change Order. Therefore, the Contractor acknowledges that it is not entitled to a change in the Contract Sum or the Contract Time in the absence of a written Change Order on the basis of the course of conduct or dealings between the parties and/or the Owner’s express or implied acceptance of alterations or additions to the Work and/or the Owner has been unjustly enriched by the Contractor’s Work or any other basis otherwise allowed by law or the facts and Contractor agrees that any such extra or changed work was performed by it as volunteer.

7.2 CHANGE ORDERS

7.2.2 Add the following to Article 7.2.2:

Contractor’s execution of a Change Order constitutes a final settlement to the contract Sum and construction schedule and the Contract Time for all matters relating to or arising out of the change in the Work that is subject of the Change Order including, but not limited to, all direct and indirect cost associated with such change, all extended direct job site and home office overhead expenses and any and all delay and impact cost for the change, whether alone or in combination with other changes, including any impact, ripple or cumulative effect resulting there from, if any.

7.2.3 Add the following to Article 7.2.3:

Adjustments to the Contract Sum by Change Order shall be based upon one of the methods set forth in Article 7.3.3.1, 7.3.3.2, 7.3.3.3 or 7.3.3.4, as appropriate. A reasonable allowance for the combined overhead and profit included in the Change Order shall be based upon the schedule set forth in Article 7.3.11, as supplemented.

7.2.4 Add the following to Article 7.2.4:

In order to facilitate consideration of Change Order requests, all such request, except those involving an amount less than \$500 must be accompanied by a complete itemization of cost, including labor, materials and subcontractor cost which shall likewise be itemized. Changes for more than \$500 will not be approved without such itemization.

7.3 CONSTRUCTION CHANGE DIRECTIVE

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7.3.5 Add “Owner or” between “the” and “Contractor” in both places they appear in this Article.

7.3.8 Delete the first sentence and insert the following:

The amount of credit to be given by the Contractor to the Owner for a deletion or change which results in a net decrease in the Contract Sum shall be the actual net cost plus reasonable allowances for the combined overhead and profit based upon the schedule set forth in Article 7.3.11.

7.3.11 Add the following to Article 7.3.11:

The allowance for overhead and profit combined, including all taxes, permits, insurance, bond, job superintendent, job and home office expenses, extended direct job and home office overhead, and any and all delay, impact, inefficiency, disruption and ripple effect to be included in the total cost to the Owner is limited to fifteen (15%) percent for adds and zero (0% percent) for deducts of the total of the actual cost of materials, labor and subcontracts. All subcontractors shall acquiesce to the same requirements when participating in a Change Order.

Cost to which overhead and profit is to be applied shall be determined in accordance with Article 7.3.4.

ARTICLE 8 – TIME

8.2 PROGRESS AND COMPLETION

8.2.1 Add the following to the end of the second sentence of Article 8.2.1:

...and that the Contractor is fully capable of properly completing the Work within the Contract Time.

8.3 DELAYS AND EXTENSIONS OF TIME

8.3.1 Add the following to the end of Article 8.3.1:

However, to the fullest extent permitted by law, and notwithstanding any other provisions in the Contract Documents, the Owner and its agents and employees, and the Architect shall not be liable for any damages for delay for direct or indirect costs, extended home office overhead, idle or inefficient labor or equipment, cost escalations, or monetary claims of any nature arising from or attributable to delay by any cause whatsoever, the Contractor’s sole and exclusive remedy for delay by any cause whatsoever is an extension of the Contract Time but no increase in the Contract Sum. Adverse weather shall not be grounds for time extensions unless the number of days exceeds the days provided in Section 01 29 10, and directly affects the overall completion of the Work as reflected in the critical path of the Contractor’s updated and accepted construction schedule.

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8.3.3 Add the following to the end of Article 8.3.3:

No delay, interferences, hindrance or disruption, from whatever source or cause, in the progress of the Contractor's Work shall be a basis for an extension of time and/or additional compensation, unless the delay, interference, hindrance or disruption (1) is without the fault and not the responsibility of the Contractor, its subcontractors and/or suppliers and (2) directly affects the overall completion of the Work as reflected on the critical path of the Contractor's updated and accepted construction schedules. The Contractor expressly agrees that the Owner shall have the benefit of any float in the construction schedule and that delays to construction activities, which do not affect the overall completion of the Work, do not entitle the Contractor to any extension in the Contract Time and/or increase the Contract Sum.

8.3.4 Add the following Article 8.3.4:

All claims by the Contractor for an increase in the Contract Time must follow the procedures set forth in Article 15.1.2, 15.1.3, 15.1.5 and 15.1.6, including the requirements that the Contractor give written notice of any claim within twenty-one (21) days after occurrence of the event giving rise to such claim or within twenty-one (21) days after the Contractor first recognizes the conditions giving rise to the claim, whichever is earlier.

8.3.5 Add the following Article 8.3.5:

If the Contractor submits a schedule indicating or otherwise expressing an intent to complete the Work prior to the date of substantial completion, the Owner shall have no liability to the Contractor for any failure by the Contractor to complete the Work prior to the expiration of the Contract Time.

ARTICLE 9 – PAYMENTS AND COMPLETION

9.3 APPLICATIONS FOR PAYMENTS

9.3.1 Add the following to the end of Article 9.3.1:

The form of Application for Payment will be the current edition of the AIA Document G702, Application for Certification for Payment, supported with AIA Document G703, Continuation Sheet.

9.3.1.3 Add the following to Article 9.3.1.3:

In any contract awarded by the State of Mississippi or any agency, unit or department of the State of Mississippi, or by any political subdivision thereof, the amount of retainage that may be withheld is governed by Mississippi law.

In all other contracts, the Owner will retain, until the Work is one hundred (100%) percent complete, five (5%) percent of the amount due the Contractor on account of

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progress payments. No reduction in retainage will be made until final payment is made except that when the original Contract amount is in an amount equal to or greater than \$750,000.00, then whenever such Work is fifty (50%) percent complete and on schedule and satisfactory, in the opinion of the Architect and the Owner, fifty (50%) percent of the retainage may be returned to the Contractor and two and one half (2 1/2%) percent will be retained on all subsequent progress payments. The Owner may subsequently increase the retainage if the Contractor's manner of completion of the Work and/or its progress do not remain satisfactory to the Architect and/or Owner or if the Surety withholds its consent to payment for other good and sufficient reasons.

When submitting request for reduction in retainage, the Contractor shall include, with the application, a Consent of Surety to Reduction of Retainage, and a Power of Attorney.

9.3.2 Add the following to the end of the first sentence in Article 9.3.2:

...upon submission by the Contractor of an application for payment for such materials and/or equipment, supported by invoice(s) for such materials and/or documentation required by Section 00 73 00, Article 9.3.2.2, subparts .4.

9.3.2.1 Add the following to Article 9.3.2.1:

Payment for materials stored at some location other than the Project site, may be approved by the Architect and the Owner after the Contractor has submitted the following items:

- .1 An acceptable Lease Agreement between the Contractor or one of its subcontractors or suppliers and the owner of the land, or building, where the material is stored.
- .2 Consent of Surety or other acceptable bond to cover the materials stored off-site.
- .3 All Perils Insurance coverage for the full value of the materials stored off-site.
- .4 A Bill of Sale from the Manufacturer to the Contractor for the stored materials.
- .5 A complete list of inventory of materials manufactured, stored and delivered to the storage site and of materials removed from the storage site and delivered to the Project.
- .6 A review by the Architect of the materials stored off-site prior to release of payment. The Contractor shall pay the Architect at the standard hourly rates of the Architect plus mileage as allowed by the IRS for the Architect to visit and verify off-site stored materials. This time and mileage begins and ends at the Architect's office.
- .7 Proof of payment of stored materials verified by the supplier must be submitted to the Architect within thirty (30) days of the application for Payment on which payment for said materials was made. If proof of payment is not submitted within thirty (30) days, then payment for said materials will be deducted from the next application for payment and withheld until proof of payment is received.

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9.3.2.2 Add the following to Article 9.3.2.2:

If approved for payment by the Architect, then payment for stored materials will be made for the invoice amount, overhead and profit will be limited to a total of ten (10%) percent of the invoice amount. Any remaining balance for this item on the Schedule of Values will be paid to the Contractor upon incorporation of the materials into the Project. Payment for stored materials shall not exceed the amount indicated in the Schedule of Values less retainage.

9.3.3 Add the following to the first sentence, between “Application for Payment” and “will” in Article 9.3.3:

, whether incorporated in the Project or not,

9.5 DECISIONS TO WITHHOLD CERTIFICATION

9.5.1.7 Delete the word “repeated.”

9.5.1.8 Add the following to Article 9.5.1.8:

The letter from the Contractor which is required by Article 15.1.5.2 has not been received.

9.6 PROGRESS PAYMENTS

9.6.1 Delete Article 9.6.1 in its entirety and insert the following:

Subject to the conditions of the Contract, the Owner shall make payment to the Contractor in the amount certified within thirty (30) days after receipt of the Certificate for Payment from the Architect. Payment shall not be considered late until thirty (30) days after Owner’s receipt of the approved Certificate for Payment from the Architect.

9.6.1.1 Contractor’s Application for Payment shall be submitted on or before the 25th day of each month. Any application not submitted on or before this date may not be processed or approved until the following month.

9.6.7 Delete the word “Unless” from the first sentence in Article 9.6.7 and insert the phrase “Whether or not”

Add the following to the end of Article 9.6.7:

The amount retained by the Contractor from each payment to each Subcontractor and material supplier shall not exceed the percentage retained by the Owner from the Contractor for the Subcontractor’s Work.

9.7 FAILURE OF PAYMENT

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9.7 Delete the words “or awarded by binding dispute resolution” in the first sentence in Article 9.7

9.8 SUBSTANTIAL COMPLETION

9.8.1 Delete Article 9.8.1 in its entirety and insert the following:

Substantial Completion for purposes of this Contract occurs only upon Contractor’s compliance with the following conditions precedent:

- (a) the Contractor furnishes Contractor’s completed punch list, (b) the Contractor furnishes all life safety systems subcontractors inspection report, (c) the Contractor furnishes all other required documentation by other specification sections, (d) the Architect certifies that the work is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended purpose, (e) the Owner, Architect, Fire Marshal and/or Building Inspector witness a life safety systems test, (f) the Fire Marshal and/or Building Inspector provides the Contractor with a Certificate of Occupancy and (g) The Contractor furnishes the Guarantee of Work set forth herein below.

The Guarantee of Work shall be submitted as a separate document signed by the Contractor and Contractor’s Surety and shall state the following:

Contractor and Contractor’s Surety

hereby guarantees that all Work performed on the Project is free from defective and/or nonconforming materials and workmanship and that for a period of one (1) year from the date of final completion or such longer period of time as may be called for in the Contract Documents for such portions of the Work, Contractor or its Surety will repair and/or replace any defective and/or nonconforming materials and workmanship in accordance with the requirements of the Contract Documents.

9.8.2.1 Add the following to Article 9.8.2.1:

The Contractor shall be responsible for the costs of inspections made by the Architect including any and all other related expenses incurred by the Architect for providing services for the Project required by failure of the Contractor to achieve final acceptance/completion of the Project within thirty (30) days after the first occurrence of the below described events:

1. Specified date of Substantial Completion; or
2. Actual date of Substantial Completion.

The cost of the Architect’s additional services shall be deducted by the Owner from the Contractor’s final application for payment to pay the Architect for additional services

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required by the Contractor's failure to achieve final completion of the Project within the thirty (3) day period described above.

9.8.4 Delete the last sentence of Article 9.8.4 and insert the following:

Warranties required by the Contract Documents shall commence on the date of final acceptance/completion unless otherwise provided in the Contract Documents.

9.8.5 Add the following to the end of Article 9.8.5:

Contractor's execution of the Certificate of Substantial Completion constitutes Contractor's representation that the items on the list accompanying the Certificate can and will be completed by Contractor and his subcontractors within thirty (30) days of Contractor's execution of the Certificate. Based upon this representation by the Contractor and upon the acknowledgment of the Architect that the listed items remaining can be completed within thirty (30) days, the Owner agrees to execute the Certificate of Substantial Completion. If Contractor fails to complete the items on the list within thirty (30) days of Contractor's execution of the Certificate, then the Owner, as its option and without prejudice to any other rights or remedies it may have under this Contract or otherwise and without notice to Contractor or Surety, may proceed to have same completed and to deduct the reasonable costs thereof from the amounts then due or thereafter to become due to the Contractor.

9.8.6 Add the following Article 9.8.6

The costs for inspections requested by the Contractor and made by the architect which are not required by Article 4, 9.8, 9.10 or 12 of the General Conditions and any other inspection required by Article 12 other than the year-end inspection itself, will be the responsibility of the Contractor and will be deducted by the Owner from the application for Payment submitted after the Owner's receipt of the Architect's statement for its costs of additional inspections. These costs are not the result of Contractor's failure to timely complete the Contract within the specified time and, therefore, such costs are in addition to and not part of any liquidated damages calculations, if any.

9.8.7 Add the following Article 9.8.7

Upon the Owner's acceptance of the Work as substantially complete and upon Contractor's compliance with all conditions precedent to substantial completion as stated in Section 00 73 00, Article 9.8.1 and upon application by the Contractor, the Owner will pay to the Contractor all retainage held by the Owner less an amount equal to the greater of (a) two (2%) percent of the Contract Sum, or (b) two hundred (200%) of the estimated cost of the Work remaining to be performed by the Contractor in accordance with the Architect's determination. Final payment, including all retainage, shall be made at the time and in the manner provided for final payment in accordance with the provisions of Article 9.10 and the additional conditions precedent to final acceptance / payment set forth in Section 00 73 00, Article 9.8.5.

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9.9 PARTIAL OCCUPANCY OR USE

9.9.1.2 Add the following to Article 9.9.1.2:

The Owner's occupancy or use of any completed or partially completed portions of the Work shall not affect the Contractor's obligation to complete incomplete items on the list attached to the Certificate of Substantial Completion within the time fixed in the Certificate and does not waive Owner's rights to obtain completion of incomplete items at Contractor's expense upon Contractor's failure to timely complete same.

9.10 FINAL COMPLETION AND FINAL PAYMENT

9.10.2 Insert between "warranties" and "(6)" in Article 9.10.2:

(6) all closeout documents required by the Contract Documents in a form satisfactory to the architect and Owner, and

(7) the manufactures' certificates and/or warranties required by the Contract Documents

DELETE "(6)" before "if required by Owner" and replace with "(8)":

9.11 LIQUIDATED DAMAGES

9.11.1 Add the following to Article 9.11.1:

Liquidated Damages. Time being of the essence of this Contract and a matter of material consideration thereof, a reasonable estimate in advance is established to cover losses incurred by the Owner of the Project is not substantially complete on the date set forth in the Contract Documents. The Contractor and his Surety will be liable for and will pay the Owner the sums hereinafter stipulated as fixed and agreed as liquidated damages for each calendar day for delay until the Work is substantially complete. The Contractor and his Surety acknowledge that the Owner's losses caused by the Contractor's delay are not readily ascertainable and that the amount estimated per day for liquidated damages is reasonable and is not a penalty.

See specification Section 00 41 00 – Bid Form for established amount for Liquidated Damages.

ARTICLE 10 – PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

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10.1 Add the following to the end of Article 10.1:

The Architect shall not administer the Contractor's performance of its duties and responsibilities under Article 10 because the initiation, maintenance and supervision of safety precautions and programs is the sole responsibility of the Contractor as means, methods, techniques, sequences and procedures of construction and, therefore, is not part of the Contractor's scope of Work which is to be administered by the Architect.

ARTICLE 11 – INSURANCE AND BONDS

11.4 LOSS OF USE, BUSINESS INTERRUPTIONS, AND DELAY IN COMPLETE INSURANCE

11.4 Delete Article 11.4 in its entirety

ARTICLE 12 – UNCOVERING AND CORRECTION OF WORK

12.1 UNCOVERING OF WORK

12.1.2 Delete the second sentence of Article 12.1.2 entirely and replace with:

“If such Work is in accordance with the Contract Documents, cost of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense.

12.2 CORRECTION OF WORK

12.2.2 AFTER SUBSTANTIAL COMPLETION

12.2.2.1 Add the following to the end of Article 12.2.2.1:

Prior to the end of the one-year period, the Architect may schedule a warranty inspection which shall be attended by the Architect, the Owner, the Contractor and all major subcontractors. During the inspection, the parties shall identify all defective and/or nonconforming items and fix time within which all defective and/or nonconforming items shall be repaired and/or replaced.

12.2.2.1.1 Add the following Article 12.2.2.1.1:

Within the one-year period provided for in the Guarantee of Work required by Article 9.8.1, if repairs or replacement are requested by the Owner in connection with the Work which, in the opinion of the Owner, are rendered necessary as a result of the use of materials, equipment or workmanship which are inferior, defective or not in accordance with the Contract Documents, the Contractor and/or its Surety shall promptly, upon receipt of notice from and without expense to the Owner, place in satisfactory condition in every particular, all such Work, correct all defects therein and make good all damages to the building, site, equipment or contents thereof; and make good any work or materials or the equipment and contents of said buildings or site disturbed in fulfilling any such guarantee. If, after notice or within the time agreed upon by all parties at the warranty inspection, the Contractor and/or its Surety fail to proceed promptly to comply with the

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terms of the guarantee, the Owner may have the defects corrected in accordance with Article 2.4 and the Contractor and his Surety shall be liable for all expenses incurred. All special guarantees applicable to definite parts of the Work stipulated in the Contract Documents shall be subject to the terms of this paragraph during the first year of the life of such special guarantee.

ARTICLE 13 – MISCELLANEOUS PROVISIONS

13.5 INTEREST

13.5 Delete Article 13.5 in its entirety and insert the following:

Payments due and unpaid under the Contract Documents shall bear interest as provided by applicable Mississippi law.

13.6 ATTORNEYS' FEES AND EXPENSES

13.6 Add the following Article 13.6 to private projects not funded in whole or in part by public monies:

The prevailing party in any dispute between the parties arising out of or related to this Agreement or the breach thereof, shall be entitled to reasonable attorney's and expert witness(es) fees and expenses incurred in pursuing or defending any claim.

ARTICLE 14 – TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 TERMINATION BY THE CONTRACTOR

14.1.1.4 Delete Article 14.1.1.4 in its entirety

14.2 TERMINATION BY THE OWNER FOR CAUSE

14.2.1.1 Delete the word "repeatedly" from Article 14.2.1.1.

14.2.1.3 Delete the word "repeatedly" from Article 14.2.1.3.

14.2.1.5 Add the following Articles 14.2.1.5:

Fails to achieve Substantial Completion of the Project as described in Section 00 73 00, Article 9.8.5, within the time stated therein;

14.2.1.6 Add the following Article 14.2.1.6:

Fails to meet any deadline required by the Contract. Contractor acknowledges that time is of the essence of this Contract and that all deadlines required by the Contract are critical to timely completion of the Contract. Therefore, Contractor agrees that its failure to meet any deadline constitutes a substantial and material breach of this Contract, entitling the Owner to terminate the Contract.

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14.2.2 Delete the word “certification” in the first sentence and insert the word “advice”

14.2.4 Delete the phrase “Initial Decision Maker” and insert the word “Architect” in article 14.2.4.

14.2.5 Add the following Article 14.2.5:

If the Owner terminates the Contract for cause, and its determined for any reason that the Contractor was not actually in default under the Contract at the time of termination, the Contractor shall be entitled to recover from the Owner the same amount as the Contractor would be entitled to receive under a termination for convenience as provided by Article 14.4. The foregoing shall constitute the Contractor’s sole and exclusive remedy for termination of the Contract. In no event shall the Contractor be entitled to special, consequential, or exemplary damages, nor shall the Contractor be entitled to anticipated profits resulting from termination of this Contract.

14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

14.4.3 Add after the end of the last sentence “The Contractor shall not be entitled to receive any payment for either overhead or profit on work not performed” to Article 14.4.3.

ARTICLE 15 – CLAIMS AND DISPUTES

15.1.2 Delete the phrase “in accordance with the requirements of the final dispute resolution method selected within the Agreement” from Article 15.1.2

15.1.6 CLAIMS FOR ADDITIONAL TIME

15.1.6.2 Add the following to the end of Article 15.1.6.2:

Adverse weather shall not be grounds for extensions unless the number of rain days exceed the days provided in Section 01 29 10, of the Project Specifications and directly affects the overall completion of the work as reflected in the critical path of the Contractor’s updated and accepted construction schedules.

The Contractor must submit each month with his Application for Payment a separate letter stating that he is requesting an extension of time for abnormal adverse weather or that he has no claim for an extension for that period of time. Payment is not due on the Application for Payment until the letter is received. Complete justification, including weather reports, daily reports, correspondence and any other supporting data must be provided for each day for which a request for time extension is made. A letter or statement that the Contractor was delayed is not as adequate justification. The receipt of this request and data by the Architect will not be considered as Owner or Architect approval of a time extension in any way.

15.1.6.3 Add the following Article 15.1.3.3:

Claims for increase in the Contract Time shall set forth in detail the facts and circumstances which support such Claim, including but not limited to, the cause of such

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delay, the date such delay began to affect the critical path, the date such delay ceased to affect the critical path and the number of days of additional time requested. The Contractor shall not be entitled to an increase in the Contract Time for delays which did not affect the critical path or to the extent there were concurrent non-excusable delays. The Contractor may be requested to provide additional documentation to substantiate its Claim, including but not limited to, schedules that indicate all activities affected by such delay.

15.1.7 Delete the first sentence in article 15.1.7 and replace with the following:

The Contractor and Owner waive claims against each other, Architect and Consultants for consequential damages arising out of or relating to this Contract.

15.2 INITIAL DECISION

15.2.4 Add “within thirty (30) days” to the end of article 15.2.4

15.3 MEDIATION

15.3.1 Delete the phrase “may be subject to mediation as a condition precedent to binding dispute resolution” and insert the phrase “may be subject to mediation upon mutual agreement of the Owner and Contractor” to Article 15.3.1.

15.3.3 Delete Article 15.3.3 in its entirety

15.4 ARBITRATION

15.4.1 Delete the words “parties have” in the first sentence and insert the words “Owner has” and delete the phrase “unless the parties mutually agree” and insert the phrase “unless the Owner chooses” to Article 15.4.1.

15.4.4 CONSOLIDATION

15.4.4 Delete Article 15.4.4 (including subparts .1 - .3) in its entirety

15.4.4.1 Add the following Article 15.4.4.1:

The Owner, at its sole discretion, may consolidate any arbitration, if any, conducted under this Agreement with any other arbitration to which it is a party where the Owner determines that the arbitrations to be consolidated substantially involve common questions of law or fact and the Owner, at its sole discretion, 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.

END OF SECTION

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SECTION 00 74 00
JONES COUNTY SCHOOL DISTRICT
SPECIAL CONDITIONS

PART 1 - GENERAL

The items listed below are general requirements for all contractors working on the Campus of Jones County School District.

1.01 USE OF PREMISES

- A. Construction Fence: The outer limits of any project involving a specific building or area shall be fenced using construction fencing. The bottom of this fence shall be approximately 6" above the ground to facilitate grounds maintenance. This fence shall be installed and constantly maintained in a neat and orderly condition.
- B. Construction Sign: Unless otherwise instructed, a construction signs will not be allowed.
- C. Deliveries: All deliveries made by tractor trailer shall be scheduled in advance with the Physical Plant Department. No deliveries or construction traffic shall take place during student drop-off and pick-up. Verify drop-off and pick-up times with school principals.
- D. Storage of Materials: All supplies and materials should be stored on site within the limits of the construction fence. JCSD will, at its discretion, allow the storage of materials in some outer areas of the campus. This is subject to requirements and availability. The district accepts no responsibility for theft, vandalism, or damage caused by weather of these stored materials.
- E. Parking: Parking for all contractors and employees will be limited to unpaved areas designated by the district. JCSD may designate underused lots on the perimeter of campus for the Contractor's use.
- F. Utility Usage: JCSD will absorb the cost of normal utility usage during the term of the contract. Excessive charges to JCSD caused by inefficient use of those utilities will be passed on to the Contractor. Any new service that must be installed will be at the expense of the Contractor.
- G. Utility Outages: Any utility outages required throughout the term of this Contract must be scheduled at least 5 days in advance with the Physical Plant Department.
- H. Safety and Security: Protection of students, faculty, staff, and the general public shall at all times be the responsibility of the Contractor. This should be accomplished using barricades, lights, signs, or other means necessary to meet or exceed the requirements of the International Building Code. Security of the construction area itself from fire, vandalism, weather, etc., is likewise the responsibility of the Contractor. Any and all costs necessary to repair damages caused by these or other acts are solely the responsibility of the Contractor.

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- I. Landscape Repair: The Contractor shall be responsible for all trees, shrubs, ground cover, or sod damaged during construction. Replacement plants shall be approved by the Physical Plant Department. Any damaged grass shall be replaced with common Bermuda sod likewise approved by the Physical Plant Department.
- J. Work Hours/Days: Contractor shall inform the District when work will take place after regular working hours, nights, and weekends. Noise producing Work or any construction activity that disturbs students or staff will not be allowed during regular school hours. No work activity shall take place during state testing.
 - 1. Work during school hours on non-state testing and senior/semester exams days will be limited and shall be coordinated in advance. JCSD will relocate the students and staff to allow interior access. The contractor shall limit interior traffic while students are present. Anyone not following the attire as required by 1.04 items C will be escorted out and removed from the campus.
- K. Keys: Any necessary keys will be checked out to the Project Superintendent at the Physical Plant Department.

1.02 NON-INTERFERENCE

- A. It is expected that this Contract will be carried out with little, if any, interference with daily campus activities. It should also be kept in mind that coordination with other contractors working other projects will often be necessary. This coordination is the responsibility of the contractors involved.

1.03 THEFT AND VANDALISM

- A. While JCSD may allot space for the storage of materials, this is strictly a courtesy to the Contractor. JCSD accepts no responsibility for theft or vandalism of those stored materials. Likewise, any theft or vandalism to materials or to the job site itself is the responsibility of the Contractor.

1.04 CONDUCT OF WORKERS

- A. Firearms: No firearms of any kind are allowed on the campus of Jones County School District.
- B. Alcohol: The possession or consumption of alcoholic beverages by any employee is forbidden.
- C. Attire: Shirts and pants shall be worn by all employees at all times. All construction staff shall wear a high-visibility fluorescent lime green safety vest with the contractor's or subcontractor's name and/or logo. Contractor shall maintain additional safety vests on site for visitors, suppliers, and others as needed.
- D. Conduct of Workers: Any worker identified as having used offensive language or gestures to any student, faculty, or staff member will be asked to leave the job. There will be no exceptions.

END OF SECTION

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SECTION 00 91 13

ADDENDA

PART 1 - GENERAL

1.01 SUMMARY

- A. Addenda: Any addenda to the drawings or specifications issued before or during the time of bidding shall be included in the proposal and become a part of the Contract.
- B. Indicate receipt of addenda on the proposal form.

END OF SECTION

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SECTION 00 94 00

RECORD MODIFICATIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. Changes to the Contract will be handled through Change Order, AIA Document G701.

END OF SECTION

SECTION 01 11 00
SUMMARY OF WORK

PART 1 - GENERAL

1.01 CONTRACT DOCUMENTS

- A. The Contract Documents for providing the Work of the Project include the following:
 - 1. Architect's Drawings dated June 25, 2025.
 - 2. Project Manual (including Specifications) dated June 25, 2025.

1.02 WORK TO BE EXECUTED UNDER THIS CONTRACT

- A. The Project is the construction of a stand-alone Soccer-Volleyball Fieldhouse, expansion of Softball Fieldhouse, and the replacement of the Softball Pressbox.
- B. The work shall include all labor, materials, equipment, services, and related activities and procedures necessary to the complete construction including the buildings, site work, mechanical, plumbing, electrical, and other improvements as shown on the Drawings and required in the Specifications (Project Manual).

1.03 WORK TO BE EXECUTED BY THE OWNER UNDER SEPARATE CONTRACT

- A. The Owner reserves the right to award contracts for additional work by others during the course of this Project. The Contractor and all its subcontractors shall cooperate fully with all such parties in scheduling and performing any additional work as may be required by the Owner.
- B. Landscaping by the Owner. Landscape grading, topsoil, sod, and seeding by the General Contractor.
- C. Interior loose furnishings shall be provided and installed under a separate contract.

1.04 WORK SEQUENCE AND CONDITIONS

- A. Coordinate construction schedule and operations with the Architect.
- B. Work before or after school hours, nights and weekends, and School Holidays/Breaks shall be coordinated with the Owner.
- C. Work access shall be coordinated with the Owner.
- D. No access is allowed into the building at any time during school hours without written permission from the Owner and Architect. Noise producing Work or any construction activity that disturbs students or staff will not be allowed during normal school hours.
- E. For emergency contact, the Contractor shall have someone on call for emergency response within one (1) hour of receipt of call.

- F. The Contractor shall coordinate the construction schedule and operations with the Owner and Architect. The Contractor shall not work on testing days at the school during the schedule testing times.
- G. Work shall not disturb or disrupt the day-to-day operations of the school.
- H. Construction traffic and deliveries limitations – No deliveries or construction traffic shall be scheduled during student drop-off and pick-up verify times with school principals. Construction traffic shall also be minimized during these times.
- I. Contractor shall maintain a safe means of egress at all times. Contractor shall maintain & assist the Owen in providing a safe access & aggress to all buildings during construction.
- J. Construction Work shall be scheduled in phases during the allowed construction time. Below is an anticipated project schedule.
 - 1. Contract Award – August 11, 2025.
 - 2. Pre-Construction Meeting – August 25, 2025.
 - 3. Submittals and Shop Drawings – August 25, 2025, through September 22, 2025.
 - 4. Work restriction:
 - a. Interior demolition of the existing Softball Fieldhouse shall commence on May 4, 2026, or after the new Softball Fieldhouse expansion is substantially completed and students have relocated and vacated the existing softball fieldhouse.
 - b. Demolition of the existing softball pressbox shall commence on May 4, 2026, or after Softball Season has ended.
 - 5. Site Mobilization and Construction Commencement:
 - a. Soccer-Volleyball Fieldhouse – August 25, 2025
 - b. Softball Fieldhouse Expansion & Renovation – August 25, 2025
 - c. Softball Pressbox – May 4, 2026
 - 6. Substantial Completion:
 - a. Soccer-Volleyball Fieldhouse on or before May 15, 2026
 - b. Softball Fieldhouse Expansion & Renovation on or before July 24, 2026
 - c. Softball Pressbox on or before December 11, 2026
- K. Commence work immediately upon issuance of a "Notice to Proceed" order from the Architect, all Contracts and Beginning Documents having been executed, and all required Bonds and Insurances are in force.

END OF SECTION

SECTION 01 14 00
WORK RESTRICTIONS

PART 1 - GENERAL

1.01 CONTRACTOR'S USE OF PREMISES

- A. The Contractor shall limit his use of the premises for work as described in the drawings and specifications.
- B. The Contractor shall assume full responsibility for the protection and safekeeping of products under this Contract stored on the site.
- C. The school campus will remain occupied during much of the construction period. Coordinate the work of this project to minimize disruptions to the Owner.
- D. State law prohibits the use of tobacco products on any public school property. The use of tobacco products on site will not be permitted throughout the duration of the project.
- E. State law prohibits the possession or use of alcohol or illegal drugs on public school property and is considered improper conduct, resulting in the removal of worker and the possibility of filing charges against the worker.
- F. The Contractor shall enforce strict discipline and good order among employees.
- G. Noise producing Work or any construction activity that disturbs students or staff will not be allowed during regular school hours. No work activity shall take place during state testing.
- H. Do not allow any workers in an occupied school building for any reason without the expressed written consent of the Owner.
- I. Contractor employees will not utilize school facilities for any reason; any Contractor employees in an occupied school building will be permanently removed from the site.
- J. Do not fraternize with students, faculty, staff or administrators at any time.
- K. All construction staff shall always wear a high-visibility safety vest with the contractor's or subcontractor's name and/or logo for identification purposes.

END OF SECTION

SECTION 01 21 00
ALLOWANCES

PART 1 - GENERAL

1.01 LATENT CONDITIONS ALLOWANCES

A. Amount:

1. Include a \$40,000.00 allowance for latent conditions in the contract sum.

B. Products:

1. Defects exposed to view under normal pre-bid observation conditions are not eligible for replacement under this allowance.
2. Products that are specifically designated to be removed or replaced elsewhere in the specifications or that are indicated on the drawings are not eligible under this allowance.
3. Replacement products shall be in conformance with the respective technical specifications for the type material replaced. If there is no specification for the product, it shall match the existing original product. If the original product cannot be obtained, the contractor shall submit an appropriate substitute product for the Architect's review and approval.

C. Procedure:

1. The Contractor shall present a list of proposed unit prices for concealed materials that may be defective and subject to removal. The Architect shall approve prices which are fair and reasonable. Proposed prices shall include itemized material and labor/installation costs. All overhead, profit, sales or other taxes, bonds, and insurance shall be included in the contractor's original bid and shall not be deducted from the latent conditions allowance.
2. The Contractor shall notify the Architect at least 24-hours prior to schedule the uncovering of work so the Architect may be present.
3. The Contractor shall notify the Architect whenever he uncovers existing work that would prohibit proper construction if left in place as any part of the substrate.
4. The Architect shall review the work and verify the conditions claimed. He is authorized to prepare a signed, written Construction Change Directive itemizing the specific type, location, and quantity of material that should be replaced and a fair and reasonable price.
5. The Contractor shall perform the work described in the Construction Change Directive in accordance with the respective technical specification for the material involved and all conditions of this Contract.

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6. The Architect is not authorized to expend funds by Construction Change Directive in excess of the amount specified under the allowance. Any work required in excess of this amount must be done by a separate written Change Order which must be approved prior to execution of the work.
7. The Contractor may elect to proceed with replacement of minor defective incidental work without notifying the Architect or going through the Construction Change Directive approval process if there will be no costs charged to the allowance or the Owner.
8. Any materials replaced or works performed prior to obtaining the Architect's Construction Change Directive are not chargeable under this allowance.

1.02 CASH ALLOWANCES: PRODUCTS

A. Costs included in allowances:

1. Actual cost of product or item to the Contractor substantiated by invoice (not manufacturer-suggested retail), less any applicable trade discounts.
2. Invoices for materials covered under allowances shall be delivered directly to the Architect as provided from material suppliers. Adjustments to the contract sum will be made according to the actual invoices delivered to the Architect.

B. Contractor's costs included in the contract sum (original bid):

1. Contractor's costs for transportation to the site, unloading and handling on the site
2. Protection of materials from elements and damage.
3. All labor, installation costs, sales or other taxes, overhead, profit, bonds, insurance, incidentals and other expenses, as required for the complete installation, shall be included in the contractor's original bid and shall not be deducted from the product allowance.

C. Schedule of cash allowances:

1. \$400.00 per thousand for purchase and delivery of face brick.
2. \$350.00 per cylinder per lockable door in the building to purchase Best cylinders and cores keyed to the Owner's specifications and to have the permanent cores installed by Best representatives. For this project, assume 40 cylinders or a total allowance of \$14,000.00. This amount will be adjusted up or down after the final numbers are determined. The labor to install cylinders in locksets and panic devices shall be included in the Base Bid.
3. \$20,000.00 for Power company charges for new electrical service to the new field houses.

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4. \$50,000.00 for Testing laboratory and Inspection services. Refer to Section 01 45 23 Testing and Inspection Services.

1.03 RECORDS

- A. The contractor shall maintain a record of all expenditures authorized and approved by the Architect's Construction Change Directives under each allowance and submit a written report of expenditures and allowance balance at the Architect's and/or Owner's request.
- B. The Contractor shall include all allowances on the schedule of values per the amount scheduled.
- C. Amounts due on allowances shall not be paid until product/item is installed or stored on site per the contract requirements.
- D. At project closeout, should the actual costs incurred be more or less than the specified amount of any allowance, the contract sum will be adjusted by a Change Order equal to the amount of the difference.

END OF SECTION

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SECTION 01 22 00

UNIT PRICES

PART 1 - GENERAL

1.01 PROCEDURES

- A. Purpose of unit prices:
 - 1. To enable the Owner to consider alternative amounts of construction.
 - 2. To allow the possibility of adding to the Scope of Work of the Project in such a manner that the Owner receives the Project most beneficial to the Owner for the available funds.
- B. Acceptance or rejection of any unit price items is at the sole discretion of the Owner.
- C. Accepted unit price items shall become a part of the Owner-Contractor Agreement.

1.02 SCHEDULE OF UNIT PRICES

- A. Unit Price Number 1: The Contractor shall provide a unit price for additional concrete sidewalk. This shall be a per s.f. cost as an additive or deductive cost associated with the base. (Note: All concrete sidewalks shown on the drawings shall be included in the base bid).
- B. Unit Price Number 2: The Contractor shall provide a unit price for excavation and fill. This shall be per c.y. cost as an additive or deductive cost associated with the base. (refer to drawings for volume/quantity to be included in the base bid).

END OF SECTION

SECTION 01 23 00

ALTERNATES

PART 1 - GENERAL

1.01 PROCEDURES

- A. Purpose: To enable the Owner to consider alternative levels of construction and to compare costs with the possibility of adjusting the level of quality and/or adding or subtracting from the Scope of Work of the Project in such a manner that the Owner receives the Project most beneficial to the Owner for the available funds.
- B. Acceptance or rejection of any alternate is at the sole discretion of the Owner.
 - 1. The Owner has not established a priority for the alternates. The Owner reserves the right to award or reject alternates in any order and in any combination so that the Owner receives the best possible project within the available funds.
- C. Accepted alternates shall become a part of the Owner-Contractor Agreement.

1.02 SCHEDULE OF ALTERNATES

- A. Alternate Number 1: Soccer-Volleyball field house size increase by 16'-0".
- B. Alternate Number 2: Tectum Clouds at Weightroom Ceilings (TYPE V).

END OF SECTION

SECTION 01 25 13

PRODUCT SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.01 SUBSTITUTION PROCEDURES

- A. Products of other manufacturers equal to those specified herein will be considered for substitution. Refer to the General Conditions for additional requirements.
- B. **Substitutions will not be considered during the bid phase or any other time prior to the award of the Contract.**
- C. Not later than thirty (30) days from the contract date, the Contractor shall provide a list showing the name of the manufacturer proposed to be used for each of the products identified in the Project Manual and, where applicable, the name of the installing subcontractor.
- D. The Architect will promptly reply in writing to the Contractor stating whether the Owner or the Architect, after due investigation, has reasonable objection to any such proposal.
- E. Within thirty (30) days after the Contract has been executed, the Owner and the Architect will consider a formal request for the substitutions of products in place of those specified. The General Contractor is responsible for providing product data and product references to substantiate that substitutions are equal to products specified. By making requests for substitutions, the Contractor represents the following:
 - 1. That he or she has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to the specified product.
 - 2. That he or she will provide the same warranty for the substitutions as that required for the specified product.
 - 3. That the cost data is complete and includes all related costs under this Contract and that any claims for additional costs and/or time in connection with the substitution are hereby waived.
 - 4. That he or she will coordinate the installation of the accepted substitute, making such changes as may be required for the work to be complete in all respects.

END OF SECTION

SECTION 01 29 00
PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 APPLICATION FOR PAYMENT

- A. Submit Application for Payment to the Architect:
 - 1. Submit applications on AIA Document G702.
 - 2. Submit one (1) electronic application for payment each month.
 - 3. Break down project costs by division and section in CSI format. Provide a sample for approval ten (10) days prior to submittal of first application.
 - 4. The Contractor shall submit monthly certification to the Architect indicating payments to subcontractors on prior payment requests. Use Form 01 29 00-A provided herein.
- B. The Contractor shall deliver with the executed contract a schedule of anticipated payments for the work. This schedule will assist the Owner in financial planning for the construction phase of the project.
- C. The Contractor shall submit each month with the Application for Payment a separate letter either requesting an extension of time or stating that no extension is needed for that period of time. If such letter is not received with the Application for Payment, no extension of time will be considered for the pay period. Complete justification, including weather reports, correspondence, etc., must be included for each day's request for extension. A Contractor's letter or statement will not be considered as adequate justification. The receipt of this request and data by the Owner will not be considered as Owner approval in any way.
- D. Refer to specification section 00 73 00 Supplementary Conditions for retainage requirements. Retainage may be reduced on public projects (as defined by Miss. Code Ann. §31-3-1) in accordance with the provisions of Miss. Code Ann. §31-5-33. On private projects, retainage will not be reduced prior to final payment.

1.02 MISSISSIPPI SALES TAX

- A. Payments for Mississippi sales tax may be made by either of the following methods:
 - 1. Lump sum payment: Prior to payment by the Owner, the Contractor must furnish receipt as proof of tax payment.
 - 2. Monthly sales tax payment: Prior to payment of sales tax on a monthly basis, the Contractor must furnish proof of a valid Mississippi MPC number for the project.

END OF SECTION

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FORM 01 29 00-A

AFFIDAVIT CERTIFYING PAYMENT TO ALL SUBCONTRACTORS

I acknowledge that, pursuant to Miss. Code Ann. 31-5-25 and H.B. 1562, Laws of 2002, I am required to submit monthly certification indicating payments to subcontractors on prior payments requests. I, the undersigned Contractor, do hereby certify that I have paid the following amounts to subcontractors for work which has been performed and incorporated into previous Applications for Payment which were issued, and payment received from the Owner on the project listed below. I understand that this document must be submitted on a monthly basis after the submittal, approval, and payment of Application for Payment No. 1.

PROJECT: South Jones High School Athletic Buildings

Subcontractor _____	Amount _____
Subcontractor _____	Amount _____
Subcontractor _____	Amount _____
Subcontractor _____	Amount _____
Subcontractor _____	Amount _____
Subcontractor _____	Amount _____
Subcontractor _____	Amount _____
Subcontractor _____	Amount _____
Subcontractor _____	Amount _____

(Attach additional list of subcontractors and amounts if necessary.)

Contractor's Name and Title: _____

Contractor's Certificate of Responsibility Number: _____

Contractor's Signature: _____ Date: _____

STATE OF MISSISSIPPI

COUNTY OF _____

SWORN AND SUBSCRIBED BEFORE ME, the undersigned notary public, this the _____ day of _____, 20____.

NOTARY PUBLIC

My Commission Expires: _____.

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END OF FORM

SECTION 01 29 10
WEATHER DELAYS

PART 1 - GENERAL

1.01 EXTENSION OF CONTRACT TIME

- A. An extension of time on the basis of weather may be granted only for the number of Weather Delay Days in excess of the number of days listed as the Standard Baseline for that month.

1.02 STANDARD BASELINE FOR AVERAGE CLIMATIC RANGE

- A. Standard Baseline is defined as the normal number of calendar days for each month during which construction activity exposed to weather conditions is expected to be prevented and suspended by cause of adverse weather. Suspension of construction activity for the number of days each month as listed in the Standard Baseline shall be included in the Work schedule and is not eligible for extension of Contract Time.

- B. Standard Baseline is as follows:

January	– 7 Days
February	– 6 Days
March	– 7 Days
April	– 5 Days
May	– 6 Days
June	– 6 Days
July	– 9 Days
August	– 7 Days
September	– 6 Days
October	– 4 Days
November	– 5 Days
December	– 7 Days

1.03 ADVERSE WEATHER AND WEATHER DELAY DAYS

- A. Adverse Weather is defined as the occurrence of one or more of the following conditions within a twenty-four (24) hour day that prevents critical path construction activity exposed to weather conditions:
1. Precipitation (rain, snow, or ice) in excess of one-tenth inch (0.10”) liquid measure.
 2. Temperatures that do not rise above that required for the day’s construction activity if such temperature requirement is specified or accepted as standard industry practice.
- B. Adverse Weather may include, if appropriate, “dry-out” or “mud” days resulting from precipitation days that occur beyond the standard baseline and only if there is a hindrance

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to critical path work and Contractor has taken all reasonable accommodations to avoid such hindrance.

- C. A Weather Delay Day may only be counted if adverse weather prevents work on the critical path.
- D. Contractor shall take into account that certain construction activities are more affected by adverse weather and seasonal conditions than other activities, and that “dry-out” or “mud” days are not eligible to be counted as Weather Delay Day until the standard baseline is exceeded.

END OF SECTION

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 PROJECT SUPERVISION

- A. The Contractor shall employ a competent supervisor and necessary assistants who shall be in attendance at the project site at all times during performance of the work. The project supervisor shall not be moved to another project or otherwise fail to be in attendance at the project site until the project is substantially complete with all punch list items corrected or until the Architect and the Owner approve of the supervisor's absence from the project site.

1.02 PROJECT MEETINGS

- A. A pre-construction conference will be held prior to initiation of the work. A representative from the Contractor and each subcontractor shall attend.
- B. Monthly project meetings shall be held during the construction process. The General Contractor shall have a representative at all project meetings. All subcontractors shall be present.

1.03 PRE-INSTALLATION CONFERENCES OR INSPECTIONS

- A. Conduct a conference at the project site before each construction activity that requires coordination with other construction. Examples:
 - 1. Cast-in-place concrete (the Contractor shall notify the Architect and the independent testing laboratory twenty-four (24) hours in advance of any pour)
 - 2. Gypsum board (closing in uninspected work. Do not cover up or enclose work until it has been properly and completely inspected and reviewed. Should any of the work be covered up or enclosed prior to verification, uncover the work as required for inspection. Make all repairs and replacements with such materials and workmanship as are necessary at no additional cost to the Owner)
- B. The installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations shall attend the meeting. Coordinate with the Architect for scheduled meeting dates.
- C. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference.

END OF SECTION

SECTION 01 31 19.16

MOBILIZATION AND DEMOBILIZATION

PART 1 - GENERAL

1.01 SCOPE

- A. Mobilization/Demobilization consists of moving in, including preparatory work and operations and moving out, including all dismantling and clean-up work and operations performed by the Contractor.
- B. Mobilization: Includes movement of all labor, equipment, supplies and incidentals to the project site; establishment of facilities necessary for work on the project; and other work and operations which must be performed or costs not directly attributable to other pay items, exclusive of bidding costs, which must be incurred by the Contractor before beginning and during the early stages of production work on the project site.
- C. Demobilization: Includes movement of all labor, equipment, supplies and incidentals from the project site; dismantling and removal of temporary facilities; clean-up of the project site and all work areas; and other work and operations which must be performed or costs not directly attributable to other pay items which must be incurred by the Contractor after completion of certain items of work and all other work on the Contract has been completed.

1.02 MEASUREMENT

- A. The percentage of the lump sum amount for this Item will be measured in accordance with the mobilization/demobilization schedule submitted by the Contractor and approved by the Architect within the following limitations:

<u>% of Total Contract Earned</u>	<u>% of Maximum Lump Sum This Item Allowed</u>
10%	40%
25%	60%
80%	90%

- B. When all work under this Contract is completed by the Contractor and accepted by the Architect, one hundred percent (100%) of the Lump Sum Amount will be allowed.
- C. Total Contract earned will be equal to certified estimates approved by the Architect exclusive of the Mobilization-Demobilization Lump Sum and Materials Stored Amounts.

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1.03 PAYMENT

- A. Mobilization will be paid for at the Contract Lump Sum Price in accordance with the provisions included under Measurement. This price shall be full compensation for all mobilization and demobilization in accordance with the Contract Documents.

Payment will be made under:

Item 01 31 19.16-A Mobilization/Demobilization per Lump Sum

END OF SECTION

SECTION 01 32 00

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.01 PROJECT RECORD DOCUMENTS

- A. The Contractor shall maintain at the site for the Owner one (1) record copy of the following for general use (maintain these documents in a clean, dry, legible condition; **do not use documents stored at the weatherproof meeting building or trailer in the field**):
1. Contract Drawings.
 2. Specifications.
 3. Addenda: One (1) copy of each addendum shall remain intact and unaltered. Another copy of each addendum shall be cut and taped onto the corresponding page of the plans or specifications. The first Application for Payment will not be approved until this is complete.
 4. Change Orders: The Contractor is responsible for maintaining a complete Change Order log and other modifications to the Contract.
 5. Submittals: The Contractor is responsible for maintaining a set of reviewed shop drawings, product data, and samples.
 6. Test Reports: Field test records shall be the responsibility of the Contractor to maintain and log.
 7. Requests for Information (RFI's): The Contractor is responsible for maintaining a concise and complete RFI log.
 - a. The Contractor shall present the RFI log, including all pending RFI's, at each monthly meeting.
 - b. The Contractor is responsible for recording all responses that address and/or resolve RFI's.
 8. Project Meeting Notes: Project meetings shall be held monthly during the construction process. The Contractor shall have a representative at all project meetings.
 - a. The Contractor shall administer monthly meetings and prepare minutes for distribution to the Architect and the Owner.
- B. The Contractor shall maintain two (2) copies of contract drawings, specifications, and shop drawings for future record. These documents are referred to as "As-Built."
1. Mark all modifications in red.

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2. Keep record documents current. Update as-built drawings on a daily basis. Do not permanently conceal any work until required information has been recorded.
3. Drawings: Legibly mark to record actual construction.
 - a. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
 - b. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
 - c. Field changes in dimension and detail.
 - d. Changes made by Change Order(s) or Construction Change Directive(s).
4. Project Manual and Addenda: Legibly mark up each section to record manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
5. Shop Drawings: Maintain as record documents. Legibly mark to record any changes made after review.
6. Two (2) copies of "As-Builts" are required prior to closeout.

1.02 WORK SCHEDULE

- A. Coordinate the project schedule and operations with the Owner's requests. Follow the construction schedule as outlined in the Contract Documents.
- B. The Contractor shall at all times conduct his operations as to ensure the least inconvenience to the Owner.
- C. The Contractor, promptly after being awarded the contract, shall prepare and submit for the Owner's and the Architect's information a detailed Contractor's Construction Schedule for the work. The schedule shall be in bar chart form with a separate line for each significant activity. Review this schedule in form and content and revise to meet the approval of the Architect and the Owner. The schedule shall not exceed time limits established by the Contract Documents.
- D. The Contractor must submit each month with his Application for Payment an updated construction schedule.
- E. If the construction work at any time is delayed or falls behind the schedule as established by the Contractor's Construction Schedule, the Contractor shall promptly submit a Plan of Recovery which outlines in detail the methods and means required to insure that the project is brought back on schedule. The Contractor's Plan of Recovery shall address manpower, materials, and coordination efforts as required to successfully implement the Contractor's Construction Schedule. The Contractor's Plan of Recovery shall be submitted to the Owner and the Architect for approval not more than five (5) calendar days from the date of the Architect's letter requesting said Plan of Recovery.

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- F. The Contractor shall execute Daily Job Reports which address weather conditions, status of indoor/outdoor work, phase of construction, crew sizes/capacity, and subcontractor's work progress. The Contractor's Daily Job Reports shall be submitted to the Architect prior to each Application for Payment.

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SUBMITTALS

- A. The Contractor shall determine and verify all field measurements, field construction criteria, manufacturer's catalog numbers, and conformance of submittal data with the requirements of the Contract Documents. The Contractor shall verify that the item as submitted is coordinated with other work of the project. The Architect will not review shop drawings unless they bear the Contractor's verification of review and approval.
- B. The Contractor shall furnish the Architect with shop drawings, product data, and samples as outlined in the Architect's submittal requirements. The Architect will furnish the Contractor with submittal requirements at the pre-construction conference.
- C. Furnish the Architect with a minimum of one (1) electronic copy of shop drawings and submittals (individual specification sections may require additional copies).
- D. The Contractor shall retain one (1) copy of each submittal on the project site at all times.
- E. All materials that require a color selection shall be submitted (together) before any color selections will be made.
- F. The Architect's review is only for general conformance with the design concept and the information given in the Construction Documents. Corrections or comments made on the shop drawings during this review do not relieve the Contractor from compliance with the requirements of the plans and specifications. Review of a specific item shall not include review of an assembly of which the item is a component. The Contractor is responsible for dimensions to be confirmed and correlated at the job site, information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences, and procedures of construction, and coordination of the **work** with that of all other trades and performing all **work** in a safe and satisfactory manner.

1.02 RELATED SECTIONS

- A. Section 00 73 00 – Supplementary Conditions (3.12.9)

1.03 COLOR SELECTION

- A. All submittals that require a color selection shall be submitted together.

END OF SECTION

SECTION 01 41 00

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 CODES AND STANDARDS

- A. Strictly comply with the latest edition of the International Building Code and other applicable local, municipal, state, and federal codes.
- B. All permits and inspections required for the execution of the work shall be provided by the Contractor at no additional cost to the Owner.
- C. Obtain certificates of approval, acceptance, and compliance with regulations of agencies having jurisdiction. Work shall not be deemed complete until such certificates have been delivered to the Owner.
- D. The Contractor shall submit a construction notice of intent and obtain appropriate permit(s) to discharge storm water into state waters in accordance with the Mississippi Department of Environmental Quality Storm Water Pollution Control Program. The Contractor shall also be responsible for permit compliance, plan development, implementation, maintenance, inspections, and reporting as required by the Mississippi Department of Environmental Quality.

END OF SECTION

SECTION 01 45 23

TESTING AND INSPECTION SERVICES

PART 1 - GENERAL

1.01 SUMMARY

A. Work included

1. Testing and inspections as described in various Sections of the Project Manual and/or elsewhere in the Construction Documents.
2. Testing and inspection as described in Chapter 17 Structural Tests and Special Inspections of International Building Code.
3. Testing and inspection required by local, municipal, state, and federal codes.
4. Cooperate with selected testing agencies and all others responsible for testing and inspecting work.
5. Testing and inspecting as specified to be furnished by the Contractor and/or Subcontractors in this Section and/or elsewhere in the Construction Documents.
6. Coordination of testing and inspection as noted in this section and/or elsewhere in the Construction Documents shall be by the Contractor and/or Subcontractors.

B. Related Sections affecting work of this Section include, but are not limited to:

1. General Conditions
2. Section 00 73 00 – Supplementary Conditions
3. All Sections related to the inspection required by Chapter 17 Structural Tests and Special Inspections of International Building Code.

C. Related Work

1. Additional requirements for testing may be described in various Sections of these Specifications.
2. Where no testing requirements are described, but the Owner decides that testing is required, the Owner may require such testing to be performed under current pertinent standards for testing. Payments for such testing will be made as described in this Section.

1.02 SELECTION OF TESTING LABORATORY AND INSPECTORS

- ###### **A.**
- The Owner will select an independent testing laboratory and inspectors for the testing and inspection of all work related with:

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1. Inspections required by Chapter 17 Structural Tests and Special Inspections of International Building Code.
2. All testing and inspections as described in various Sections of this Project Manual and/or elsewhere in the Construction Documents and required by local, municipal, state, and federal codes shall be furnished by the Contractor at no additional cost to the Owner.

1.03 PAYMENT FOR TESTING AND INSPECTION

- A. Payment for testing and inspection shall be as follows:
 1. Payment for testing and inspection related with Chapter 17 Structural Tests and Special Inspections of International Building Code shall be as follows:
 - 1 Payment for initial testing and inspection shall be by allowance except as noted elsewhere. Refer to Section 01 21 00 – Allowances
 - 2 Payment for re-testing and/or re-inspection shall be by the Contractor.
 2. Payment for all other testing and inspections as described in various Sections of this Project Manual and/or elsewhere in the Construction Documents and required by local, municipal, state, and federal codes shall be by the Contractor.
- B. When initial tests and inspections indicate non-compliance, with inspections required by Chapter 17 Structural Tests and Special Inspections of International Building Code, all other testing and inspections as described in various Section of this Project Manual and/or elsewhere in the Construction Documents, and required by local, municipal, state, and federal codes, subsequent re-testing and/or re-inspection occasioned by the non-compliance shall be performed by the same testing and/or inspecting agency. The cost for re-testing and re-inspection shall be by the Contractor.
- C. Re-testing and re-inspection shall be carried out without change in Contract Sum or Contract Time.
- D. All work required to be performed prior to re-testing and/or re-inspection shall be carried out without change in Contract Sum or Contract Time.
- E. When the testing laboratory and/or inspection agencies are ready to test according to the established schedule, but is prevented from testing, taking specimens, or inspecting due to incompleteness of the Work, all extra cost attributable to the delay shall be paid by Contractor.

1.04 QUALITY ASSURANCE

- A. The testing laboratory shall be qualified in accordance with ASTM E329.
- B. Testing, when required, shall be in accordance with all pertinent codes and regulations, and with selected standards of the American Society of Testing and Materials.

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- C. Testing and inspection shall be performed in strict accordance as required by Chapter 17 Structural Tests and Special Inspections of International Building Code, in various Section of the Project Manual and/or elsewhere in the Construction Documents, and by local, municipal, state, and federal codes.

1.05 REPORTS

- A. Promptly process and distribute required copies of test and/or inspection reports and related instruction to assure necessary re-testing, re-inspection, and/or replacement of materials.
- B. Required reports
 - 1. Provide one (1) digital copy (Portable Document Format – PDF) of the reports to the Owner, Architect, and Contractor.
 - 2. Provide all other reports as required.
- C. Contractor shall be responsible for distribution of all testing and certification compliance reports.

1.06 CODE COMPLIANCE TESTING AND INSPECTIONS

- A. Tests and inspections required by codes or ordinances, or by plan approval authority, and which are made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Contractor, unless otherwise provided in the Construction Documents.

1.07 CONTRACTOR'S CONVENIENCE TESTING AND INSPECTION

- A. Inspection and tests performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor and cost for convenience testing and inspection shall be by the Contractor.

1.08 TAKING SPECIMENS

- A. All specimens and samples for testing, unless otherwise provided in the Contract Documents, shall be taken by the testing personnel. All sampling equipment and personnel shall be provided by the testing laboratory. All deliveries of specimens and samples to the testing laboratory shall be performed by the testing laboratory.

1.09 SCHEDULES FOR TESTING AND INSPECTION

- A. By advance discussion with the testing laboratory and inspection agencies determine the time required for the laboratory and inspectors to perform its tests, inspections, and to issue reports for each of its findings.
- B. All required time for testing, inspection, re-testing, re-inspection and all work required to be performed prior to re-testing and/or re-inspection shall be carried out within the Contract Time.

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- C. When changes of construction schedule are necessary during construction, coordinate all such changes with the testing laboratory and inspection agencies as required not less than forty-eight (48) hours prior to any scheduled testing or inspection.
- D. Contractor shall notify the Architect not less than forty-eight (48) hours prior to any required testing or inspection.
- E. Contractor shall notify the testing laboratory and/or inspection agencies as required prior to any required testing and/or inspection to allow time for scheduling of personnel and materials.

PART 2 - PRODUCTS

2.01 CHAPTER 17 STRUCTURAL TESTS AND SPECIAL INSPECTIONS

- A. Required Verification and Inspection of Steel Construction
 - 1. Material verification of high-strength bolts, nuts and washers:
 - 1 Identification of markings to conform to ASTM standards specified in the approved construction documents.
 - 1) Frequency: Periodic Verification and Inspection
 - 2) Referenced Standard: Applicable ASTM material specifications; AISC 360, Section A3.3
 - 2 Manufacturer's certificate of compliance required.
 - 1) Frequency: Periodic Verification and Inspection
 - 2. Inspection of high-strength bolting:
 - 1 Bearing-type connections.
 - 1) Frequency: Periodic Verification and Inspection
 - 2) Referenced Standard: AISC 360, Section M2.5
 - 2 Slip-critical connections.
 - 1) Frequency: Continuous and Periodic Verification and Inspection
 - 2) Referenced Standard: ASIC 360, Section M2.5
 - 3. Material verification of structural steel:
 - 1 Identification markings to conform to ASTM standards specified in the approved construction documents.
 - 1) Referenced Standard: ASTM A 6 or ASTM A 568

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- 2 Manufacturers' certified mill test reports.
 - 1) Referenced Standard: ASTM A 6 or ASTM A 568
4. Material verification of weld filler materials:
 - 1 Identification markings to conform to AWS specification in the approved construction documents.
 - 1) Referenced Standard: AISC 360, Section A3.5
 - 2 Manufacturer's certificate of compliance required.
5. Inspection of welding:
 - 1 Structural steel: Complete and partial penetration groove welds.
 - 1) Frequency: Continuous Verification and Inspection
 - 2) Referenced Standard: AWS D1.1
 - 2 Structural steel: Multipass fillet welds.
 - 1) Continuous Verification and Inspection
 - 2) Referenced Standard: AWS D1.1
 - 3 Structural steel: Single-pass fillet welds $> 5/16"$.
 - 1) Frequency: Continuous Verification and Inspection
 - 2) Referenced Standard: AWS D1.1
 - 4 Structural steel: Single –pass fillet welds $\leq 5/16"$.
 - 1) Frequency: Periodic Verification and Inspection
 - 2) Referenced Standard: AWS D1.1
 - 5 Structural steel: Floor and roof deck welds.
 - 1) Frequency: Periodic Verification and Inspection
 - 2) Referenced Standard: AWS D1.3
 - 6 Reinforcing steel: Verification of weldability of reinforcing steel other than ASTM A 706.
 - 1) Frequency: Periodic Verification and Inspection
 - 2) Referenced Standard: AWS D1.4; ACI 318: 3.5.2

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- 7 Reinforcing steel: Reinforcing steel-resisting flexural and axial forces in intermediate and special moment frame, and boundary elements of special reinforced concrete shear walls and shear reinforcement.
 - 1) Frequency: Continuous Verification and Inspection
 - 2) Referenced Standard: AWS D1.4; ACI 318: 3.5.2
- 8 Reinforcing steel: Shear reinforcement.
 - 1) Frequency: Continuous Verification and Inspection
 - 2) Referenced Standard: AWS D1.4; ACI 318: 3.5.2
- 9 Reinforcing steel: Other reinforcing steel.
 - 1) Frequency: Periodic Verification and Inspection
 - 2) Referenced Standard: AWS D1.4; ACI 318: 3.5.2
6. Inspection of steel frame joint details for compliance with approved construction documents:
 - 1 Detail such as bracing and stiffening.
 - 1) Frequency: Periodic Verification and Inspection
 - 2 Member location.
 - 1) Frequency: Periodic Verification and Inspection
 - 3 Application of joint detail at each connection.
 - 1) Frequency: Periodic Verification and Inspection

B. Required Verification and Inspection of Concrete Construction

1. Inspection of reinforcing steel, including prestressing tendons, and placement.
 - 1 Frequency: Periodic Verification and Inspection
 - 2 Referenced Standard: ACI 318: 3.5, 7.1-7.7
2. Inspection of reinforcing steel welding
 - 1 Referenced Standard: AWS D1.4; ACI 318: 3.5.2
3. Inspect bolts to be installed in concrete prior to and during placement of concrete where allowable loads have been increased.
 - 1 Frequency: Continuous Verification and Inspection

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4. Verifying use of required design mix.
 - 1 Frequency: Periodic Verification and Inspection
 - 2 Referenced Standard: ACI 318: Ch 4, 5.2-5.4
5. At the time fresh concrete is sample to fabricated specimens for strength test, perform slump and air content test, and determine the temperature of the concrete.
 - 1 Frequency: Continuous Verification and Inspection
 - 2 Referenced Standard: ASTM C 172; ASTM C 31; ACI 318: 5.6, 5.8
6. Inspection of concrete and shotcrete placement for proper application techniques.
 - 1 Frequency: Continuous Verification and Inspection
 - 2 Referenced Standard: ACI 318: 5.9, 5.10
7. Inspection for maintenance of specified curing temperature and techniques.
 - 1 Frequency: Periodic Verification and Inspection
 - 2 Referenced Standard: ACI 318: 5.11-5.13
8. Inspection of prestressed concrete:
 - 1 Application of prestressing forces.
 - 1) Frequency: Continuous Verification and Inspection
 - 2) Referenced Standard: ACI 318: 18.20; ACI 318: 18.18.4
 - 2 Grouting of bonded prestressing tendons in the seismic-force-resisting system.
 - 1) Frequency: Continuous Verification and Inspection
 - 2) Referenced Standard: ACI 318: 18.20; ACI 318: 18.18.4
9. Erection of precast concrete members.
 - 1 Frequency: Periodic Verification and Inspection
 - 2 Referenced Standard: ACI 318: Ch. 16
10. Verification of in-situ concrete strength, prior to stressing of tendons in posttensioned concrete and prior to removal of shores and forms from beams and structural slabs.
 - 1 Frequency: Periodic Verification and Inspection

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2 Referenced Standard: ACI 318: 6.2

11. Inspect formwork for shape, location and dimensions of the concrete members being formed.

1 Frequency: Periodic Verification and Inspection

2 Referenced Standard: ACI 318: 6.1.1

C. Level 1 Special Inspection

1. As masonry construction begins, the following shall be verified to ensure compliance:

1 Proportions of site-prepared mortar.

1) Frequency: Periodic Inspection

2) Reference for Criteria: ACI 530.1 / ASCE 6 / TMS 602: Art. 2.6A

2 Construction of mortar joints.

1) Frequency: Periodic Inspection

2) Reference for Criteria: ACI 530.1 / ASCE 6 / TMS 602: Art. 3.3B

3 Location of reinforcement, connectors, prestressing tendons and anchorages.

1) Frequency: Periodic Inspection

2) Reference for Criteria: ACI 530.1 / ASCE 6 / TMS 602: Art. 3.4, 3.6A

4 Prestressing technique.

1) Frequency: Periodic Inspection

2) Reference for Criteria: ACI 530.1 / ASCE 6 / TMS 602: Art. 3.6B

5 Grade and size of prestressing tendons and anchorages.

1) Frequency: Periodic Inspection

2) Reference for Criteria: ACI 530.1 / ASCE 6 / TMS 602: Art. 2.4B, 2.4H

2. The inspection program shall verify:

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- 1 Size and location of structural elements.
 - 1) Frequency: Periodic Inspection
 - 2) Reference for Criteria: ACI 530.1 / ASCE 6 / TMS 602: Art. 3.3G
 - 2 Type, size and location of anchorage of masonry to structural members, frames or other construction.
 - 1) Frequency: Periodic Inspection
 - 2) Reference for Criteria: ACI 530 / ASCE 5 / TMS 402: Sec. 1.2.2(e), 2.1.4, 3.1.6
 - 3 Specified size, grade and type of reinforcement.
 - 1) Frequency: Periodic Inspection
 - 2) Reference for Criteria: ACI 530 / ASCE 5 / TMS 402: Sec. 1.13
 - 3) Reference for Criteria: ACI 530.1 / ASCE 6 / TMS 602: Art. 2.4, 3.4
 - 4 Welding of reinforcing bars.
 - 1) Frequency: Continuous inspection
 - 2) Reference for Criteria: ACI 530 / ASCE 5 / TMS 402: Sec. 2.1.10.7.2, 3.3.3.4(b)
 - 5 Protection of masonry during cold weather (temperature below 40°F) or hot weather (temperature above 90°F).
 - 1) Frequency: Periodic Inspection
 - 2) Reference for Criteria: ACI 530.1 / ASCE 6 / TMS 602: Art. 1.8C, 1.8D
 - 6 Application and measurement of prestressing force.
 - 1) Frequency: Periodic Inspection
 - 2) Reference for Criteria: ACI 530.1 / ASCE 6 / TMS 602: Art. 3.6B
3. Prior to grouting the following shall be certified to ensure compliance:
- 1 Grout space is clear.
 - 1) Frequency: Periodic Inspection

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- 2) Reference for Criteria: ACI 530.1 / ASCE 6 / TMS 602: Art. 3.2D
- 2 Placement of reinforcing and connectors and prestressing tendons and anchorages.
 - 1) Frequency: Periodic Inspection
 - 2) Reference for Criteria: ACI 530 / ASCE 5 / TMS 402: Sec. 1.13
 - 3) Reference for Criteria: ACI 530.1 / ASCE 6 / TMS 602: Art. 3.4
- 3 Proportions of site-prepare grout and prestressing grout for bonded tendons.
 - 1) Frequency: Periodic Inspection
 - 2) Reference for Criteria: ACI 530.1 / ASCE 6 / TMS 602: Art. 2.6B
- 4 Construction of mortar joints.
 - 1) Frequency: Periodic Inspection
 - 2) Reference for Criteria: ACI 530.1 / ASCE 6 / TMS 602: Art. 3.3B
- 4. Grout placement shall be verified to ensure compliance with code and construction documents provisions.
 - 1) Frequency: Continuous Inspection
 - 2) Reference for Criteria: ACI 530.1 / ASCE 6 / TMS 602: Art. 3.5
- 2 Grouting of prestressing bonded tendons.
 - 1) Frequency: Continuous Inspection
 - 2) Reference for Criteria: ACI 530.1 / ASCE 6 / TMS 602: Art. 3.6C
- 5. Preparation of any required grout specimens, mortar specimens and/or prisms shall be observed.
 - 1 Frequency: Continuous Inspection
 - 2 Reference for Criteria: ACI 530.1 / ASCE 6 / TMS 602: Art. 1.4
- 6. Compliance with required inspection provisions of the construction documents and the approved submittals shall be verified.
 - 1 Frequency: Periodic Inspection

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2 Reference for Criteria: ACI 530.1 / ASCE 6 / TMS 602: Art. 1.5

D. Required Verification and Inspection of Soils

1. Verify material below footings are adequate to achieve the design bearing capacity.

1 Frequency: Periodic Verification and Inspection
2. Verify excavations are extended to proper depth and have reached proper material.

1 Frequency: Periodic Verification and Inspection
3. Perform classification and testing of controlled fill materials.

1 Frequency: Periodic Verification and Inspection
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of controlled fill.

1 Frequency: Continuous Verification and Inspection
5. Prior to placement of controlled fill, observed subgrade and verify that site has been prepared properly.

1 Frequency: Periodic Verification and Inspection

E. Required Verification and Inspection of Cold-Form Steel Construction:

- 1 Periodic special inspection during welding operation of elements of seismic-force-resisting systems
- 2 Periodic special inspection for screw attachment, bolting, anchoring, and other fastening of components within the seismic-force-resisting systems, including struts, braces, and hold-downs.

F. Other required Verification and Inspection as applicable to the scope of the project.

2.02 OTHER TESTING AND INSPECTION

- A. Testing and inspections as require and described in various Sections of this Project Manual and/or elsewhere in the Construction Documents
- B. Testing and inspections as required by local, municipal, state, and federal codes.

PART 3 - EXECUTION

3.01 COOPERATION WITH TESTING LABORATORY AND INSPECTION AGENCIES

- A. Representatives of the testing laboratory and inspection agencies shall have safe access to the work at all times and at all locations where the work is in progress.

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END OF SECTION

SECTION 01 52 00
CONSTRUCTION FACILITIES

PART 1 - GENERAL

1.01 JOB SITE OFFICE

- A. The Contractor shall provide a weatherproof location to house the Contract Documents and records.
- B. Contractor is required to provide their superintendent with a cellular smart phone with telephone, text, and e-mail capability for use during normal working hours.
- C. Contractor shall be responsible for all temporary utilities and facilities that will be used in conjunction with the work included in the contract including but not limited to:
 - 1. Sanitary facilities, including toilets, wash facilities, and drinking water
 - 2. Temporary lighting and power as required
 - 3. Access to work areas
 - 4. Dumpsters, such as required for the work
 - 5. Lifts and equipment required for the work
 - 6. Temporary weather protection
 - 7. Security and protection of the work
 - 8. Barricades, working signs, lights, traffic control provisions
 - 9. Fire protection
 - 10. Emergency egress protection
- D. The Contractor is encouraged to provide a computer with internet access at the job site office.
- E. The Contractor is encouraged to provide a digital camera and internet connection at the job site for the transmission of progress photographs, and all other correspondence related to construction.

END OF SECTION

SECTION 01 56 26

TEMPORARY FENCING (CHAIN LINK)

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes

1. Provide and install temporary chain link construction fences at primary limit of work, lay down area, and other areas to keep students, staff, and general public of the construction site. Coordinate location and limits with the owner.

B. Related Sections

1. Section 01 52 00 – Construction Facilities
2. Section 32 31 13 – Chain Link Fences and Gates

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Wire Gauge and Mesh:** 11½ gauge, 2⅜" mesh.
- B. Intermediate Posts:** 1⅝" o.d. steel tubing, 12'-0" o.c. max. 18 gauge at 1.74 lbs./ft.
- C. Rails:** 1⅜" o.d. steel tubing in longest possible lengths with couplings. 18 gauge.
1. Top rails required.
- D. Terminal Posts:** 2⅜" o.d. steel tubing. 18 gauge.
- E. Post Tops:** Weathertight closure caps.
1. Permit passage of top rail.
 2. Provide means for attaching top rails at each condition encountered.
- F. Accessories:** Stretcher bars, 12½ gauge tension wire, wire ties at 12" o.c., and other items as required to provide a complete and finished system.
1. Bottom tension wire required.
- G. Fence Finish:** All components shall be pre-galvanized unless otherwise noted.
- H. Fence Height:** 6'-0". Hold bottom of fence 6" above finished grade to facilitate maintenance.
- I. Provide and install concrete footings at gate posts and terminal posts only.**

2.02 GATES

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- A. Metal and finish to match framework. Provide horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware, and accessories. Space frame members not more than 8' apart. 1 $\frac{5}{8}$ " o.d. 18 gauge tubing.
- B. Assemble gate frames by welding or with special fittings and rivets for rigid connections. Use same fabric as for fence unless otherwise indicated. Install fabric with stretcher bars at vertical edges. Attach stretchers to gate frame at not more than 15" o.c. Attach hardware to provide security against removal or breakage. Install diagonal cross-bracing consisting of $\frac{3}{8}$ " diameter adjustable length truss rods on gates to ensure frame rigidity without sag or twist. Maximum 1" clearance at top of curb.
- C. Gate Hardware: Furnish the following hardware and accessories for each gate:
 - 1. Hinges: Size and material to suit gate size, non-lift-off type, offset to permit 105-degree gate opening. Provide 1 $\frac{1}{2}$ pair of hinges for each leaf over 6' 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.

2.03 MISCELLANEOUS

- A. Accessories: Stretcher bars, 12 $\frac{1}{2}$ gauge tension wire, wire ties at 12" o.c., and other items as required to provide a complete and finished system.
- B. Fence Finish: All components shall be pre-galvanized unless otherwise noted.
- C. Padlock Hasps: Provide and install padlock hasps at all gates. Provide copy of key to the Owner for emergency site access.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Confirm locations and avoid underground utilities.
- B. Comply with recommended procedures and instructions of the fencing manufacturer. Provide secure, aligned installation.

3.02 REMOVAL

- A. Remove temporary fencing upon substantial completion of the project. Remove all posts and footings. Fill post holes and grade smooth.

END OF SECTION

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SECTION 01 58 00

PROJECT IDENTIFICATION

PART 1 - GENERAL

1.01 PROJECT SIGN

- A. The General Contractor shall erect on adequate supports and maintain one (1) neatly constructed and painted ¾" thick plywood sign approximately 4' x 8'. The Architect will provide colors, lettering, layout, and location of the sign.
- B. No other signs shall be displayed on the job site without permission of the Architect. The display of sign advertisements is strictly prohibited.

END OF SECTION

SECTION 01 73 00

EXECUTION

PART 1 - GENERAL

1.01 CUTTING AND PATCHING

- A. Execute cutting, fitting, and patching to complete the work and to:
 - 1. Fit the several parts together, to integrate with other work.
 - 2. Uncover work to install ill-timed work.
 - 3. Remove and replace defective work.
 - 4. Remove and replace work not conforming to the Contract Documents.
 - 5. Install specified work in existing construction.
 - 6. Provide openings for penetrations of mechanical and electrical work.
- B. Do not cut or alter work of another Contractor without permission.
- C. Take special care to insure that penetrations of rated walls and ceilings are not oversized.
- D. Costs caused by ill-timed or defective work or work not conforming to the Contract Documents shall be borne by the party responsible for the ill-timed, defective, or non-conforming work.
- E. Exercise care not to damage existing buildings, paving, and landscaping scheduled to remain. Repair or replace items damaged during the construction process.

1.02 EXECUTION

- A. Inspect existing conditions of work, including elements subject to movement or damage during cutting and patching.
- B. Provide shoring, bracing, and support, as required, to maintain the structural integrity of the building. Provide protection for other portions of work and protection from the elements.
- C. Execute cutting and demolition by methods which prevent damage to other work and which will provide surfaces to receive installation of repairs and new work.
- D. Restore work which has been cut or removed; install new products to provide completed work in accordance with the requirements of the Contract Documents.
- E. Refinish entire surfaces, as necessary, to provide an even finish. Refinish continuous surfaces to the nearest intersection. Refinish assemblies in their entirety.

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1.03 MOISTURE CONTROL

- A. The Contractor shall have a working moisture meter on site at all times.
- B. Wet materials shall not be installed.

END OF SECTION

SECTION 01 74 00

CLEANING AND WASTE MANAGEMENT

PART 1 - GENERAL

1.01 FINAL CLEANING

A. Buildings and other improvements:

1. In addition to removal of debris and cleaning of specified materials in other sections, clean interior exposed-to-view surfaces.
2. Remove temporary protection and labels not required to remain.
3. Clean finishes free of dust, stains, films, and other foreign substances.
4. Clean transparent and glossy materials to a polished condition; remove foreign substances. Polish reflective surfaces to a clear shine.
5. Clean, wax, and polish resilient and hard-surface floors. Use a professional cleaner.
6. Clean surfaces of equipment; remove excess lubrication.
7. Clean plumbing fixtures to a sanitary condition.
8. Clean permanent filters of ventilating equipment and replace disposable filters; in addition, clean ducts, blowers, and coils.
9. Clean light fixtures and lamps.
10. Remove waste, foreign matter, and debris from roofs, drainage systems, and site area.
11. Clean and polish hardware to a glossy finish.

B. Site:

1. Remove waste, debris, and surplus materials from the site. Clean grounds; remove stains, spills, and foreign substances from paved areas and sweep clean.
2. Sweep and remove stains from all new paving and walks.

END OF SECTION

SECTION 01 75 00
STARTING AND ADJUSTING

PART 1 - GENERAL

1.01 STARTING SYSTEMS

- A. Coordinate the schedule for the start-up of various equipment and systems.
- B. Execute start-up under supervision of the responsible Contractor's personnel in accordance with the manufacturer's instructions.
- C. Demonstrate operation and maintenance of products to the Owner's personnel prior to the date of substantial completion.
- D. Utilize operation and maintenance manuals as the basis for instruction. Review contents of manuals with the Owner's personnel in detail to explain all aspects of operation and maintenance.
- E. Submit a written report that equipment or system has been properly installed and is functioning and list persons in attendance at the demonstration.

END OF SECTION

SECTION 01 78 00
CLOSEOUT SUBMITTALS

PART 1 - GENERAL

1.01 SPARE PARTS, MAINTENANCE MATERIALS, AND MANUALS

- A. Provide products, spare parts, and maintenance materials in the quantities specified in each section in addition to that used for construction of the work. Coordinate with the Owner, deliver to the project site, and obtain receipt prior to final payment.
- B. Provide complete list with addresses and telephone numbers of subcontractors and work performed on the project. Bind said list with submittals, warranties, and instruction data relating to the project.

1.02 PROJECT CLOSEOUT

- A. The Contractor shall furnish to the Architect copies by email of the following with submission of the final Application for Payment:

<u>Item Description</u>	<u>Initiator</u> C=Contractor A=Architect	<u>Qty</u>	<u>Date Completed</u>
1. Contractor's Written Request for Final Inspection	C	2	
2. Results of Owner's Inspection (Punch List)	A	2	
3. Contractor's Written Statement: Punch List Completed	C	2	
4. Copies of Change Orders	A	2	
5. Copies of Construction Change Directive	A	2	
6. Utility Payments Settled	C	2	
7. Professional's Statement: All Allowances Settled	A	2	
8. Assessment of Liquidated Damages (if applicable)	A	2	
9. Substantial Completion Form (AIA G704)	A	2	
10. Professional's Recommendation of Acceptance	A	2	
11. Request for Final Payment (AIA G702)	C	2	
12. Twenty-four (24) color photographic prints of final project indicating details and general appearance	C	2	
13. Consent of Surety to Final Payment (AIA G707)	C	2	
14. Contractor's Affidavit of Release of Liens (AIA G706A)	C	2	
15. Contractor's Affidavit of Payment of Debts and Claims (AIA G706)	C	2	
16. Guarantee of Work: Letter (confirm provisions	C	2	

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as outlined in Section 01 78 36 – Warranty)			
17. Special Guarantees Applicable to Definite Parts of the Work	C	2	
18. Contractor's Certification of Non-Use of Asbestos-Containing Building Materials	C	2	
19. Architect's Certification of Non-Specification of Asbestos-Containing Building Materials	A	2	
20. Names and Addresses of Subcontractors	C	2	
21. Product Data Sheets and Maintenance, Operating, and Procedural Manuals (for example: metal, roof and flashing systems, mechanical systems, electrical systems, etc.)	C	2	
22. Project Record Documents (As-Builts)	C	2	
23. Letter of Acceptance from Owner for Receipt of All As-Built Drawings	A	2	
24. Recommend Publication of Final Settlement	A	2	

END OF SECTION

**SECTION 01 78 36
WARRANTY**

PART 1 - GENERAL

1.01 WARRANTY

- A. All work performed under this Contract shall be free from defects in workmanship and materials for a period of one (1) year from the date of substantial completion of the project or the portion thereof designated in the Certificate of Substantial Completion. The date of commencement of warranties for items on the list of items to be completed or corrected and attached to the Certificate of Substantial Completion will be the date of final payment.
- B. Some work performed under this Contract shall have a warranty period that exceeds one (1) year; refer to specific specification sections.
- C. During the warranty period, labor, materials, and services required to repair defects and damages shall be the responsibility of the Contractor.
- D. Light bulbs are excluded from the one-year warranty period.
- E. Contractor's warranty statement:
 - 1. The Contractor and the Contractor's Surety hereby guarantee that all work performed on the project is free from defective and/or nonconforming materials and workmanship and that, for a period of one (1) year from the date of final completion or such longer period of time as may be called for in the Contract Documents for such portions of the work, the Contractor or its Surety will repair and/or replace any defective and/or nonconforming materials and workmanship in accordance with the requirements of the Contract Documents.
 - 2. All warranties or guarantees with respect to all appliances, machinery, and equipment installed in the work by the Contractor or any subcontractor, supplier, and manufacturer are hereby assigned to the Owner, and the Owner is hereby subrogated to all of the same.

END OF SECTION

SECTION 02 41 00

DEMOLITION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish all labor and materials necessary to complete all demolition work shown on the drawings and as specified and as required to accomplish all new work specified herein.
- B. Remove designated doors, frames, partitions, ceilings, mechanical, electrical, and miscellaneous building components as specified herein and as indicated on the drawings and as required to accomplish all new work specified herein.
- C. Refer to mechanical and electrical specifications and drawings and general demolition plans. Mechanical and electrical subcontractors are to cap and identify existing utility lines.
- D. Take care to avoid damaging existing building(s) and elements shown to remain.
- E. Provide and install temporary bracing as necessary to ensure the structural stability of load-bearing elements. Provide and install wood blocking as specified herein and as indicated on the drawings.
- F. Take care to include work described in general and specific demolition notes on the drawings.
- G. Take care to avoid damaging existing building windows.
- H. Remove and dispose of all debris, waste, and surplus materials whether generated by the demolition process or existing.

1.02 EXISTING CONDITIONS

- A. Asbestos-containing materials may be present in the existing building. See the Asbestos Inspection Report in Appendix A of these specifications.
- B. Lead-based paint may be present in the existing building. See the Lead-Based Paint Report in Appendix B of these specifications.
- C. Conduct demolition to minimize interference with adjacent building areas. Maintain protected egress and access at all times.

1.03 DISPOSAL OF DEBRIS

- A. Remove debris on a daily basis. Do not stockpile waste and debris.
- B. Dispose of all debris in a manner that complies with all municipal, state, and federal regulations.

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- C. Pay any and all fees associated with debris disposal.

PART 2 - PRODUCTS

2.01 SALVAGE MATERIALS AND EQUIPMENT

- A. Materials and equipment scheduled to be removed (and not re-used) shall become the property of the General Contractor unless specifically designated in the Construction Documents.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Erect and maintain weatherproof closures for exterior openings.
- B. Erect and maintain temporary partitions to prevent the spread of dust.
- C. Protect existing items not scheduled for alteration.
- D. Disconnect, remove, and cap designated utility services within demolition areas.
- E. Take special care to protect wall, ceiling, and floor finishes scheduled for re-use.
- F. Prior to demolishing designated walls and partitions, investigate the weight-bearing characteristics. Provide and install temporary shoring and permanent framing to permit the removal of load-bearing elements. Notify the Professional immediately if partitions scheduled for removal appear to be load-bearing.
- G. Mark the locations of disconnected utilities. Identify and indicate capping locations on Project Record Documents.
- H. No sandblasting will be permitted for any reason.
- I. Staging Area:
1. The Contractor must enclose and secure the entire staging area with construction fencing. Protect existing plant materials within the staging area. No parking or staging is permitted within the drip line of any tree.
 2. The Contractor shall construct suitable chutes for the conveyance of debris from heights above 8'-0".
 3. The Contractor is responsible for maintaining traffic control within limits of the work.

3.02 EXECUTION

- A. Demolish in an orderly and careful manner. Protect existing supporting structural members. Do not alter any structural elements without prior approval of the Professional.

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- B. Except where noted otherwise, immediately remove demolished materials from the site.
- C. Remove materials to be re-installed or retained in a manner to prevent damage.
- D. Remove and promptly dispose of any contaminated, vermin-infested, or dangerous materials.
- E. Do not burn or bury materials on site.
- F. Remove demolished materials from the site as work progresses. Upon completion of work, leave areas of work in clean condition.
- G. The Contractor is responsible for strict compliance with all applicable state laws, municipal ordinances, and the rules and regulations of state agencies having jurisdiction over demolition procedures.
- H. The Contractor is responsible for payment of any and all fees associated with the disposal of demolished materials.
- I. Execute cleaning work as required to remove all dust and debris generated by the demolition work.
- J. Any trade that requires a trench or a ditch shall be responsible for excavating the trench or ditch, disposing of associated debris, filling the trench or ditch, and compacting it as required for finalizing the surface, whether paving or sod. Disturbed paved areas shall be patched by the General Contractor.
- K. Concrete cutting shall be performed so as to minimize opening sizes as required for each penetration. Drill pilot holes to locate openings. Locate openings to avoid conflicts with reinforcing steel wherever possible. Core-drill or saw-cut openings. Use of pneumatic air hammers or jackhammers is not permitted.

END OF SECTION

SECTION 03 11 00
CONCRETE FORMING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Formwork for cast-in-place concrete, with shoring, bracing, and anchorage.
- B. Openings for other work.
- C. Form accessories.
- D. Stripping of forms.

1.02 RELATED SECTIONS

- A. Section 03 20 00 – Concrete Reinforcing
- B. Section 03 30 00 – Cast-In-Place Concrete

1.03 REFERENCES

- A. ACI 301 – Specifications for Structural Concrete for Buildings.
- B. ACI 347 – Recommended Practice for Concrete Formwork.
- C. PS 1 – Construction and Industrial Plywood.

1.04 SCOPE OF WORK

- A. Design, engineer, and construct formwork, shoring, and bracing to meet design and code requirements so that resultant concrete conforms to required shapes, lines, and dimensions.
- B. Gradebeams in interior of building shall be earth formed. Gradebeams on building exterior perimeter shall have inside face earth formed, exterior face wood formed. Construction joints shall have 2 levels of horizontal shear keys.

1.05 QUALITY ASSURANCE

- A. The design and engineering of the formwork, as well as its construction, shall be the responsibility of the General Contractor and in accordance with ACI 301 and ACI 347.
- B. Design formwork for loads, lateral pressures, and allowable stresses outlined in Section 102 and 103 of ACI 347 – Recommended Practices for Concrete Formwork and wind loads so specified by the governing building code.
- C. Forms shall conform to the shapes, lines, and dimensions of the members as called for on the plans and shall be constructed as to ensure that the concrete surfaces will conform to the tolerances of ACI 347, Section 203.1.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Plywood: PS-1, MDO or BB grade, Class 1.
- B. Lumber: Southern Yellow Pine species; #3 S4S grade; with grade stamp clearly visible. Use only on unexposed surfaces.

2.02 ACCESSORIES

- A. Form Release Agent: Colorless materials which will not stain concrete, absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.
- B. Nails, spikes, lag bolts, through bolts, anchorages: Sized as required; of strength and character to maintain formwork in place while concrete is placed.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and measurements before proceeding with formwork.

3.02 PREPARATION

- A. Hand-trim sides and bottoms of earth form; remove loose dirt prior to placing concrete.
- B. Minimize form joints. Symmetrically align joints and make watertight to prevent leakage of mortar.
- C. Arrange and assemble formwork to permit stripping so that concrete is not damaged during its removal.
- D. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.
- E. Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

3.03 ERECTION

- A. Design, erect, support, brace, and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure.
- B. Design formwork to be readily removable without impact, shock, or damage to cast-in-place concrete surface and adjacent materials.
- C. Construct forms to sizes, shapes, lines, and dimensions shown. Construct forms to obtain accurate alignment, locations, grades, level and plumb work in finished structures.

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Provide for openings, offsets, sinkages, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up joints to prevent leakage of cement paste.

- D. Fabricate forms for easy removal without hammering or prying against concrete surfaces.
- E. Do not displace or damage moisture barriers or waterproofing.

3.04 APPLICATION

- A. Apply form release agent on formwork in accordance with manufacturer's instructions. Apply prior to placing reinforcing steel, anchoring devices, and embedded items.
- B. Soak contact surfaces of untreated forms with clean water. Keep surfaces wet prior to placing concrete.

3.05 INSERTS AND EMBEDDED PARTS

- A. Provide formed openings where required for work embedded in or passing through concrete.
- B. Install accessories in accordance with manufacturer's instructions, level and plumb. Ensure items are not disturbed during concrete placement.
- C. Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete.
- D. Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Take care to recess slabs at brick porches.
- E. Any plumbing or electrical piping passing through walls or gradebeams shall have pvc sleeves. Sleeves cannot cut horizontal reinforcing bars in gradebeams or footings.

3.06 CLEANING

- A. Clean forms to remove foreign matter as erection proceeds.
- B. During cold weather, remove ice and snow from forms. Do not use de-icing salts.
- C. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove wood, chips, sawdust, dirt, or other debris just before concrete is placed.

3.07 SHORE AND SUPPORTS

- A. Comply with ACI 347 for shoring and reshoring and as herein specified.

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- B. Remove shores and reshore in a planned sequence to avoid damage to partially cured concrete. Locate and provide adequate reshoring to safely support work without excessive stress or deflection.
- C. Keep reshores in place a minimum of 15 days after placing upper tier, and longer if required, until concrete has attained its required 28-day strength and heavy loads due to construction operations have been removed.

3.08 FORM REMOVAL

- A. Do not remove forms and bracing until concrete has sufficient strength to support its own weight, and construction and design loads which may be imposed upon it.
- B. Reshore structural members due to design requirements or construction conditions to permit successive construction.
- C. Do not damage concrete surfaces during form removal.
- D. Formwork not supporting weight of concrete may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations and provided curing and protection operation are maintained.
- E. Formwork supporting weight of concrete may not be removed in less than 14 days and until concrete has attained 70% of the minimum design compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.

3.09 RE-USE OF FORMS

- A. Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new form work.

END OF SECTION

SECTION 03 20 00
CONCRETE REINFORCING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Reinforcing steel bars and welded steel wire fabric for cast-in-place concrete and masonry.

1.02 RELATED SECTIONS

- A. Section 03 1113 - Concrete Formwork
- B. Section 03 3113 - Cast-In-Place Concrete
- C. Mechanical
- D. Electrical

1.03 REFERENCES

- A. ACI 301 – Specifications for Structural Concrete for Buildings.
- B. ACI 315 – Details and Detailing of Concrete Reinforcement.
- C. ANSI/ASTM A82 – Cold Drawn Steel Wire for Concrete Reinforcement.
- D. ANSI/ASTM A185 – Welded Steel Wire Fabric for Concrete Reinforcement.
- E. ASTM A615 – Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- F. CRSI – Manual of Practice.
- G. CRSI 63 – Recommended Practice for Placing Reinforcing Bars.
- H. CRSI 65 – Recommended Practice for Placing Bar Supports, Specifications and Nomenclature.

1.03 SUBMITALS

- A. Refer to Submittal Procedures
- B. Shop Drawings:
 - 1. Indicate size, spacing and Locations for Members
 - 2. Tie Connections

1.04 QUALITY ASSURANCE

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- A. Perform concrete reinforcement work in accordance with CRSI Manual of Standard Practice, and Documents 63 and 65.
- B. Conform to ACI 315.
- C. Acceptable Manufacturers: Regularly engaged in the manufacture of steel bars and welded wire fabric.
- D. Installers Qualifications: Three years experience in the installation of steel bar and welded wire reinforcing.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver reinforcing to project site in bundles marked with metal gages indicating contents of bundle keyed to fabrication schedule.
- B. Handle and store materials to prevent contamination and deterioration.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Reinforcing Steel: ASTM A615, 60 ksi yield grade billet-steel deformed bars, uncoated finish.
 - 1. All bars shall be grade 60
- B. Welded Steel Wire Fabric: ANSI/ASTM A185 plain type; in flat sheets; uncoated finish.

2.02 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 18 gage annealed type.
- B. Contractor shall provide metal assemblages to keep rebar centered in CMU when placing and pouring. These devices shall be spaced at 16" on center vertically, and used in all CMU walls or pilasters that are reinforced.

2.03 FABRICATION

- A. Fabricate in accordance with ACI 315, providing concrete cover specified in Section 03 30 00.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars" for details and methods of reinforcement placement and supports and as herein specified.
- B. Clean reinforcement of loose rust and mill scale, earth, and other materials which reduce or destroy bond with concrete.

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- C. Place reinforcement to obtain at least minimum coverage for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The Contractor shall furnish all labor, materials, form-work equipment, and services required to complete all the concrete work shown on the drawings and specified herein, including all sidewalks, concrete pavement, foundations, building slabs, and poured cmu bond beams and pilasters.
- B. The concrete slab must be treated as a finished floor at all times during construction.**
- C. Cast-in-place slabs and paving.
- D. Cast-in-place concrete footings.
- E. Concrete fill at CMU walls.
- F. Cast in place concrete sidewalks.
- G. The General Contractor is responsible for using Temporary Floor Protection throughout the project to safeguard the surface quality of concrete slabs before and after application of decorative finishes or installations of other materials.

1.02 RELATED SECTIONS

- A. Submittal Procedures
- B. Testing Laboratory Services
- C. Section 03 11 00 – Concrete Forming
- D. Section 03 20 00 – Concrete Reinforcing
- E. Section 07 26 16 – Below Grade Vapor Barrier
- F. Section 31 23 10 – Excavation and Fill
- G. Section 31 31 16 – Termite Control
- H. Mechanical
- I. Electrical

1.03 REFERENCES

- A. ACI 301 – Specifications for Structural Concrete for Buildings.

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- B. ASTM C33 – Concrete Aggregate.
- C. ASTM C94 – Ready-Mixed Concrete.
- D. ASTM C150 – Portland Cement.
- E. ASTM C260 – Air-Entraining Admixtures for Concrete.
- F. ASTM C494 – Chemical Admixtures for Concrete.

1.04 SUBMITTALS

- A. Refer to Submittal Procedures.
- B. For each concrete mix used in the project, submit the design mix to the Architect for review and approval, prior to use on the project.
- C. The Contractor shall establish a design mix to provide concrete of the strengths called for in the plans and specifications.
- D. After a design mix has been approved by the Architect, there shall be no charge made without consent of the Architect in either the manufacturer, aggregate supplied, or any admixtures.
- E. Concrete of the strength and slump as called for on the plans and in the specifications shall be proportioned according to the American Concrete Institute's Recommended Practice 613 using normal Type I cement supplemented with air-entraining admixtures and set-controlling admixtures.
- F. The proportions of aggregate to cement for any concrete mix shall be such as to produce a mixture which will work readily into corners and angles of the forms and around reinforcement with the method of placing employed on the work, but without permitting the materials to segregate or excess free water to collect on the surface.

1.05 TESTS

- A. An independent testing laboratory as employed by the Owner shall perform initial testing and certification compliances reports.
 - 1. Field and control cylinders shall be cast, cured and tested for each pour. Cylinders to be cast on the job according to ASTM C-31 and laboratory tests will follow ASTM C-39. A set of six 4" diameter cylinders shall be made per pour when placing concrete for every pour from 0-50 yards and/or increment thereof; all of these cylinders shall be placed in a moist curing room and left therein until tested. Two cylinders shall be tested at seven (7) days and three cylinders at twenty-eight (28) days or as directed. Except as noted above, the sampling, curing and testing of cylinders shall be in accordance with ASTM Designation C172 (sampling) C31 (curing) and C39 (testing). The Architect and Engineer shall receive a report on the cylinder break results, within 2 days of time of testing.

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- B. When initial tests and inspections indicate non-compliances with the construction documents, the costs for subsequent tests associated with that non-compliance will be charged to the contractor.
- C. Test reports shall be furnished to the Contractor, Architect, and Owner for all tests required. Test reports shall be furnished within 48 hours of the test procedure.
- D. The Contractor shall notify the Architect and the independent testing laboratory twenty-four (24) hours in advance of any pour.

1.06 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following codes, specifications and standards, except where more stringent requirements are shown or specified.
 - 1. ACI 318 "Building Code Requirements for Reinforced Concrete."
 - 2. ACI 318 "Manual of Standard Practice for Detailing Reinforced Concrete Structures."
- B. The ready mixed concrete plant shall be certified for conformance with the requirements of the National Ready Mixed Concrete Association.
- C. Slump: ASTM C 143: one test for each concrete load at point of discharge and one test for each set of compressive strength test specimens. The Contractor and the testing service are responsible for taking slump tests and adjusting water volume.
- D. Air Content: ASTM C 173: Volumetric method for normal weight of discharge; and one test for each set of compressive strength test specimens.
- E. Concrete Temperature: Test hourly when air temperature is 40 degrees F and below, and when 80 degrees F and above; and each time a set of compression test specimens are made.
- F. The General Contractor is responsible for using Temporary Floor Protection throughout the project to safeguard the surface quality of concrete slabs before and after application of decorative finishes or installations of other materials.
- G. Compression Test Specimens: ASTM C 31: one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory testing.
- H. Compressive Strength Tests: ASTM C31: one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory testing.
- I. Test results will be reported in writing to the Architect and Contractor. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength and type of break for both 7-

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day tests and 28-day tests. The 7-day test results shall be considered satisfactory only if they equal 70% of the 28-day design requirement.

- J. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strength and other characteristics have not been attained in the structure, as directed by Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by methods as directed. Contractor shall pay for all tests conducted, and any other additional testing as may be required when unacceptable concrete is verified.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Portland Cement: ANSI/ASTM C150, Type I, unless otherwise acceptable to the Architect. Use one brand of cement throughout project, unless otherwise acceptable to Architect.
- B. Fine and Coarse Aggregates: ANSI/ASTM C33. Maximum size shall be 1 inch river rock. Fill for bond beams and pilasters in CMU walls shall use pea- gravel size aggregate.
- C. All mixing water shall be clean and free from deleterious amounts of acids, alkalies, or organic materials.
- D. Air-Entraining Admixture: ANSI/ASTM C 260.
- E. Water Reducing Admixture: ANSI/ASTM C 494, Type A, and contain not more than 1% chloride ions.
- F. Water-Reducing, Accelerator Admixture: ASTM C 494, Type C or E. Subject to compliance with requirements, provide one of the following:
1. "Accelguard 80"; Euclid Chemical Co.
 2. "Pozzolith 122-HE"; Master Builders.
 3. "Polarset"; W. R. Grace.
 4. "Sikacrete"; Sika Chemical Co.
- G. Fly Ash: 20% maximum by weight of fly ash shall be used - ASTM C618.
- H. Expansion joint material where required shall be 1/2 inch thick asphalt-impregnated pre-molded fiber conforming to the latest revised Standard Specification for Preformed Expansion Joint Filler for Concrete, ASTM D1752.
- I. Curing compound shall conform to the latest revised Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete, ASTM C309. Take special care to insure that curing compound is compatible with final floor finish. **Some finish floors prohibit the use of curing compound; Contractor verify.**

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- J. Non-Shrink Grout: CRD-C 588, factory pre-mixed grout. Type D – Non-Metallic:
1. "Masterflow 713"; Master Builders.
 2. "SonogROUT"; Sonneborn-Contech.
 3. "Euco-NS"; Euclid Chemical Company.
 4. "DuragROUT"; L & M Cost. Chemical Co.
- K. Curing, Hardener, Sealer: Acrylic base compound equal to Sonneborn's Gray Kure-N-Seal (Gray). Verify with Architect. Use this material for curing and sealing of exposed finish concrete floors as noted in Finish Schedule as Concrete (Sealed)". **Some finish floors must be water cured and chemical hardeners and sealers are prohibited. Refer to Division 9.**
- L. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
- M. Moisture-Retaining Cover: Comply with ANSI/ASTM C171.
- N. Liquid Membrane-forming Curing Compound: Liquid type membrane-forming curing compound complying with ANSI/ASTM C 309, Type 1, Class A unless other type acceptable to Architect. Some finish floors must be water-cured and chemical hardeners and sealers are prohibited. Refer to Division 9.
- O. Bonding Compound: Polyvinyl acetate, rewettable type.
- P. Epoxy Adhesive: 100% solids, two component material suitable for use on dry or damp surfaces. Subject to compliance with requirements, provide one of the following:
1. "Thiopoxy"; W. R. Grace.
 2. "Sikadur Hi-Mod"; Sika Chemical Co.
 3. "Euco Epoxy"; Euclid Chemical Co.
- Q. Sealant expansion joints and open control joints: sonolastic paving joint sealant (SL-1) by Sonneborn.

2.02 PROPORTIONING AND DESIGN OF MIXES

- A. Laboratory shall prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301.
- B. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor – when characteristics of materials, job conditions, weather, test results, or other circumstances warrant – at no additional cost to the Owner and as accepted by Architect. Laboratory tests data for revised mix design and strength results must be submitted to and accepted by Architect before using in work.

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- C. Admixtures:
1. With the Architect's approval, the Contractor may use accelerating admixtures in concrete slabs placed at ambient temperatures below 50 degrees F.
 2. With the Architect's approval, the Contractor may use air-entraining admixture in exterior exposed concrete, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate.
 3. With the Architect's approval, the Contractor may use admixtures for water-reducing and set-control in strict compliance with manufacturer's directions.
- D. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
1. Ramps and Sloping Surfaces: Not more than 3".
 2. Reinforced Foundation Systems: Not less than 3" and not more than 5".
 3. Other Concrete: Not less than 3" and not more than 5".
- E. Fly ash shall be used, not more than 20% of the cement may be replaced by fly ash.
- F. Calcium chloride shall not be used.
- G. Refer to Structural for all concrete for foundations and building slabs minimum 28 day compressive strength require.
- H. Refer to Civil for all concrete for paving minimum 28 day compressive strength require.
- I. Concrete shall be manufactured and delivered in accordance with the latest revised Standard Specification for Ready-Mixed Concrete, ASTM C94.
- J. Accelerating admixtures may be used in cold weather only when approved by the Architect. Use of admixtures will not relax cold weather placement requirements.

2.03 CONCRETE MIXES

- A. Ready-Mix Concrete: Comply with requirements of ANSI/ASTM C94, and as herein specified.
1. Proportions shall be made by weight and shall be uniformly and accurately controlled.
 2. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ANSI/ASTM C94, may be required.
 3. When air temperature is between 85 and 90 F, reduce mixing and delivery time from 90 minutes to 75 minutes maximum, and when air temperature is above 90 F reduce mixing and delivery time to 60 minutes (maximum).

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4. In cold weather, concrete operation may be assisted by using hot water or by preheating the aggregates prior to mixing operation or a combination thereof to insure that concrete is maintained at a temperature of 40 degrees or more.

2.04 ACCESSORIES

- A. Sealant at Expansion Joints and Open Controlled Joints: Sonolastic Paving Joint Sealant (SL-1) by Sonneborn.
- B. Abrasive Nosing:
 1. Provide and install abrasive nosings at all concrete steps.
 2. Equal to Safe-T-Lume by Nystrom.
 3. Extruded Aluminum, Abrasive grit black photoluminescent strip.
 4. Three-inch width.
- C. Moisture Barrier:
 1. Provide moisture barrier over prepared base material.
 2. Use only materials which are resistant to decay when treated in accordance with ANS\ASTM E 1745 Class A, as follows:
 - a. Polyethylene sheet not less than 15 mils thick. Moisture Barrier required underneath all building slabs. Lap all seams 24" and tape all penetrations and seams.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify with the Architect that all anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, held securely, and will not cause hardship in placing concrete.
- B. Verify with the Architect that all electrical conduit and piping that is to be installed underneath concrete is correctly and accurately placed and will not cause hardship in placing concrete.
- C. Verify with the Architect that all piping and floor drains are correctly and accurately in place.
- D. Verify with the Architect that all slab recesses are correctly and accurately in place.

3.02 LAY-OUT

- A. The Contractor shall lay out all concrete work from the drawings and shall furnish, set and maintain all necessary stakes, benchmarks and batter boards for determining clearly all required lines and levels.

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- B. The Contractor shall be responsible for his lay-out and shall correct any errors. Verify with Architect measurements and elevations.
- C. Dimensions for mechanical unit pads, freezer/cooler pads and other equipment pads as shown on Drawings are based on general sizes and general clearance requirements of the units. Verify actual unit sizes and clearances of specific equipment with the Mechanical contractor to insure correct dimensions.

3.03 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Apply bonding agent in accordance with manufacturer's instructions.
- B. All brackets, anchors, anchor bolts, inserts, straps and all other items to be installed in concrete shall be built in as the concrete work is executed.

3.04 PREPARATION OF FORM SURFACES

- A. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.
- B. Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instruction.
- C. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained formwork is not acceptable.
- D. See also Structural Drawings and Notes.

3.05 CONCRETE PLACEMENT

- A. Notify Architect and the independent testing laboratory twenty-four (24) hours in advance of concrete pour.
- B. Ready mixed concrete hauled in truck mixers or truck agitators shall be deposited in place within the time limits established by 2.03, A., 3.
- C. Before placing concrete, free standing water, snow, ice or other foreign materials shall be removed from subgrade. All forms shall be thoroughly cleaned, secured in position, and coated with a form-release agent.
- D. Maintain concrete cover around reinforcing as follows:

<u>Item</u>	<u>Coverage</u>
Walls (exposed to Weather or backfill)	2 inch
Footings and Concrete Formed Against the Earth	3 inch
Slabs on Fill	3 inch

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- E. Place concrete continuously between predetermined construction and control joints as approved by the Architect.
- F. Sidewalks and porches/stoops adjacent to building shall be pitched to drain water away from the building.
- G. Separate exterior slabs on fill from vertical surfaces with expansion joint filler. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface. Seal all expansion joints with approved sealant.
- H. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect upon discovery to determine course of action to address defective conditions.
- I. Preplacement Inspection: Before placing concrete, inspect, and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.
- J. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.
- K. General: Comply with ACI 304, and as herein specified.
- L. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.
- M. Placing concrete in forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
- N. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.
- O. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.
- P. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.

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- Q. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
- R. Bring slab surfaces to correct level with straight-edge and strikeoff. Use bull floats or darbies to smooth surfaces, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
- S. Maintain reinforcing in proper position during concrete placement operations.
- T. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified
- U. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators.
- V. Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305.
- W. Wet forms thoroughly before placing concrete.

3.06 FINISH OF FORMED SURFACES

- A. The General Contractor is responsible for using Temporary Floor Protection throughout the project to safeguard the surface quality of concrete slabs before and after application of decorative finishes or installations of other materials.
- B. Rough Form Finish: For formed concrete surfaces not exposed to view.
- C. Smooth Form Finish: For formed concrete surfaces exposed to view, or that are to be covered with a coating material applied directly to concrete, such as waterproofing, dampproofing, painting or other similar system. This is a cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas; with fins or other projections to be completely removed and smoothed.
- D. Smooth Rubbed Finish: Provide smooth rubbed finish to schedule concrete surfaces, which have received smooth form finish treatment, not later than one day after form removal. **Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.**
- E. Finish floors of interior slabs with a trowel finish unless otherwise designated.
- F. Paving and sidewalks and concrete treads shall have a light broom finish.
- G. Slope porches and stoops to drain towards exterior. Light broom finish at porches and stoops.

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3.07 MONOLITHIC SLAB FINISHES

- A. The General Contractor is responsible for using Temporary Floor Protection throughout the project to safeguard the surface quality of concrete slabs before and after application of decorative finishes or installations of other materials.
- B. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive mortar setting beds for tile, and other bonded applied cementitious material.
- C. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified. Begin floating when surface water has disappeared when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to a tolerance not exceeding 1/4" in 10' when tested with a 10' straight edge. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- D. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, paint, carpet, or other thin-film finish coating system. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding 1/8" in 10' when tested with a 10' straightedge. Grind smooth surface defects which would telegraph through applied floor covering system.
- E. Liquid Curing, Hardener, Sealer:
 - 1. Liquid curing compound may be used if compatible with final floor finish.
Contractor shall verify final floor finish requirements.
 - 2. Apply cure coats to sound and properly finished surface when workman can no longer damage floor by walking. Apply at rate of 200-400 square feet per gallon. Apply second cure coat as recommended by manufacturer.
 - 3. Apply dustproofing and seal coat in accordance with Room Finish Schedule immediately before occupancy of building. Do not apply until all grease and foreign material has been removed from slab as recommended by manufacturer.
 - 4. Apply all coats to form a continuous, uniform film by spray, soft-bristle pushbroom, long-nap roller or lambswool applicator. Apply tape along edges to protect walls.

3.08 CONCRETE CURING AND PROTECTION

- A. The General Contractor is responsible for using Temporary Floor Protection throughout the project to safeguard the surface quality of concrete slabs before and after application of decorative finishes or installations of other materials.

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- B. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- C. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
- D. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.
- E. Curing Methods: Perform curing of concrete by moist curing, by moisture-retaining cover curing, by curing compound, and by combinations thereof, as herein specified.
- F. Liquid curing will be allowed so long as the liquid curing compound is compatible with the final floor finish.
- G. Provide moisture curing by following methods:
 - 1. Keep concrete surface continuously wet by covering with water.
 - 2. Continuous water-fog spray.
 - 3. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide cover of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.
- H. Provide moisture cover curing as follows:
 - 1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- I. Curing Formed Surfaces: Cure formed concrete surfaces, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

3.09 MISCELLANEOUS CONCRETE ITEMS

- A. Filling-In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.
- B. All areas under concrete floor slab shall have vapor barrier with joints lapped at least 24". Take care to lay material smooth and even, and avoid tearing or puncturing. Seal tightly at all expansion joints and spaces around pipes, conduits and other penetrations.

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3.10 CONCRETE CONTROL JOINTS AT PAVING, SLABS, AND SIDEWALKS

- A. Saw cut control joints in building slab as soon as possible without raveling the new concrete. Review control joint layout with Architect prior to initiating work.
- B. Saw, install masonite strips, pre-molded plastic joints, or tool paving control joints to a minimum depth of one-fourth the slab thickness. Saw control joints 5' to 6' on center in each direction at concrete paving. Zip-strips or 1/4" masonite may be used in place of sawed joints; take special care to insure that control joints are straight.
- C. Control joints at sidewalks and porches shall be 1" deep and 1/4" wide. Tool 1/4" radius on all exposed edges. Space joints (5' to 6' maximum) evenly.
- D. All joints shall be completed before uncontrolled shrinkage cracking occurs. This may be as soon as 4 hours after placement but shall not occur later than 8 hours after placement.

3.11 SIDEWALK, PATIOS AND PORCHES: QUALITY CONTROL

- A. Deviations from flush condition between concrete panels shall not exceed 1/4 inch.
- B. Maximum sloop at sidewalks shall be 1:20 in the direction of travel unless otherwise noted in the construction documents.
- C. Maximum cross-slope at sidewalks shall be 1:48.
- D. Comply with ADA requirements at ramped transitions from parking to sidewalks to building entrances.

3.12 EXPANSION JOINTS AT CONCRETE CURBS

- A. All concrete curbs shall have expansion joints at 50'-0" cc (minimum spacing). Discontinue reinforcing at expansion joints.

3.13 SEALANT AT EXPANSION JOINTS AND OPEN CONTROL JOINTS

- A. Take special care to insure that joints are clean and free of foreign matter.
- B. Install approved sealant in strict accordance with manufacturer's written instructions.

3.14 COORDINATION

- A. Refer to Mechanical and Electrical plans and specifications for coordination of chase sizes. Take special care to coordinate holes in slabs with mechanical and electrical space requirements.

END OF SECTION

SECTION 04 05 13
MASONRY MORTARING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Mortar and grout for masonry.

1.02 RELATED WORK

- A. Section 04 05 19 – Masonry Anchorage and Reinforcing
- B. Section 04 21 00 – Brick Masonry
- C. Section 04 22 00 – Concrete Unit Masonry
- D. Section 08 11 13 – Hollow Metal Doors and Frames

1.03 REFERENCES

- A. ASTM C5 – Quicklime for Structural Purposes.
- B. ASTM C91 – Masonry Cement.
- C. ASTM C94 – Ready-Mixed Concrete.
- D. ASTM C144 – Aggregate for Masonry Mortar.
- E. ASTM C150 – Portland Cement.
- F. ASTM C207 – Hydrated Lime for Masonry Purposes.
- G. ASTM C270 – Mortar for Unit Masonry.
- H. ASTM C780 – Test Methods

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Maintain materials and surrounding air temperature to minimum 50 degrees F. prior to, during, and 48 hours after completion of masonry work.
- B. Comply with the International Masonry All Weather Council, Recommended Practices and Guide Specifications for cold weather masonry construction.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Premix Mortar: ASTM C387, using gray cement, normal strength.
- B. Mortar Color to selected by owner.

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- C. Grout Aggregate: ASTM C404.
- D. Water: Clean and potable.

2.02 MORTAR MIXES

- A. Mortar for Load-Bearing Walls and Reinforced Masonry, Non-Load-Bearing Walls, Veneers, and Partitions: ASTM C270, Type S using Property Method.
- B. Mortar for Below Grade: ASTM C270, Type M, using Property Method.

2.03 MORTAR MIXING

- A. In accordance with ASTM C270, thoroughly mix mortar ingredients as needed for immediate use
- B. Add color and admixtures in accordance with manufacturer's specifications.
- C. Anti-freeze additives are not allowed.

2.04 GROUT MIXES

- A. Minimum 2500 psi strength at 28 days: 8-10 inches slump; premixed type mixed in accordance with ASTM C476.
- B. Anti-freeze additives are not allowed.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install mortar and grout in accordance with Section 04 21 00 and 04 22 00.
- B. Work grout into cores and cavities to eliminate voids. All joints, head, bed, and collar shall be completely filled. Exception: weep holes.
- C. Do not displace reinforcing steel when placing grout.
- D. Mortar joints at face brick to be tooled concave when thumbprint hard.
- E. Mortar joints at exposed CMU to be tooled concave when thumbprint hard.
- F. Hollow metal frames shall be slushed full with grout where installed in masonry walls.
- G. Keep wall cavities free of mortar droppings and bridges.

END OF SECTION

SECTION 04 05 19

MASONRY ANCHORAGE AND REINFORCING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Masonry reinforcement, anchors, and accessories.

1.02 RELATED WORK

- A. Section 01 33 00 – Submittal Procedures
- B. Section 04 05 13 – Masonry Mortaring
- C. Section 04 21 13 – Brick Masonry
- D. Section 04 22 00 – Concrete Unit Masonry
- E. Section 05 50 00 – Metal Fabrications
- F. Section 07 27 26 – Fluid Applied Membrane Air Barriers

1.03 REFERENCES

- A. Brick Industry of America (B.I.A.)
- B. National Concrete Masonry Association

1.04 SUBMITTALS

- A. Provide a sample of all material specified.

PART 2 - PRODUCTS

2.01 REINFORCEMENT AND ANCHORAGE

- A. Brick, and cavity walls with metal stud back-up.
 - 1. Veneer anchor system:
 - a. Equal to Hohmann & Barnard
 - 1) Anchor Plate: HB-213-2X S.I.S., 12 ga., hot dipped galvanized
 - 2) Pintle: Compressed Leg 2X - Hook, 12 ga, hot dipped galvanized
 - 3) Seismic Wire: Continuous 9 ga., hot-dip galvanized, joint reinforcement wire.
 - b. Coating ASTM A153, Class B hot dipped galvanized, 1.50 oz. p.s.f. (all parts)

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- c. Anchor Plates to accommodate cavity wall.
 - d. Plate pintle sized to accommodate air space. Plate shall accept 9 gauge continuous wire, which shall be installed in each reinforced joint at 16" o.c. vertically. The anchor system shall be sized so that continuous wire shall be installed a minimum of 1 5/8" from the interior (back) side into the masonry unit and allow a minimum of 5/8" coverage at the exterior (front) side of the masonry unit. (Refer to Continuous Seismic Wire Placement, 2.01, E. of this Section)
 - e. Attach to stud back up with 2-#12-14 304 Stainless steel screws.
2. Coordinate with work performed under Section 07 27 26 – Fluid Applied Membrane Air Barriers. Spray all installed back plates with 2 coats of Fluid Applied Membrane Air Barrier. Any back plates installed after the installation of the Fluid Applied Membrane Air Barrier shall be sealed over with liquid flashing as described in Section 07 27 26 – Fluid Applied Membrane Air Barriers.
3. General Joint Reinforcement: 9 gauge hot dipped galvanized wire, for use as concrete masonry wall reinforcing as manufactured by, Hohmann & Barnard, Inc., Wire-Bond, Southern Construction Products, Inc., or approved equal, 16" o.c. each way.
- B. Exterior masonry cavity wall and interior CMU reinforcement:
1. General Joint Reinforcement: 9 gauge zinc plated wire, for use as concrete masonry wall reinforcing as manufactured by Dur-O-Wall Products, Hohmann & Barnard, Inc., Wire-Bond, Southern Construction Products, Inc., or approved equal, 16" o.c. ea. way.
2. Ladder Type reinforcement:
- a. Exterior masonry cavity walls:
 - 1) Equal to Lox-All Ladder Reinforcement #270 S.I.S. Ladder by Hohmann & Barnard, Inc.
 - 2) Coating: ASTM A153, Class B hot dipped galvanized, 1.50 oz. p.s.f.
 - 3) 9 gauge side rods x 9 gauge cross rods.
 - 4) Install 16 inches on center vertically.
 - 5) Seismiclips and continuous joint reinforcement wire (9 Gauge), which shall be installed in each reinforced joint at 16" o.c. vertically
 - 6) The anchor system shall be sized so that the continuous wire shall be installed a minimum of 1 5/8" from the interior (back) side into the masonry unit and allow a minimum of 5/8"

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coverage at the exterior (front) side of the masonry unit. (Refer to Continuous Seismic Wire Placement, 2.01, E. of this Section)

C. Interior CMU Walls:

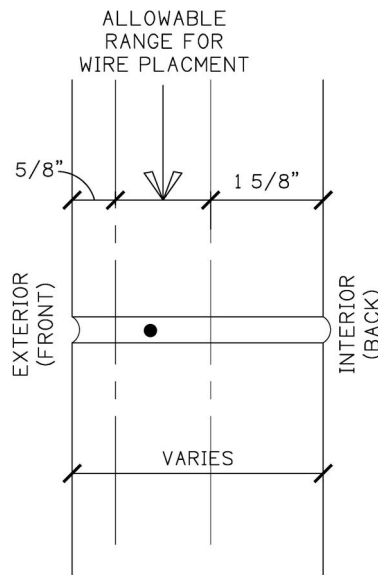
1. Equal to #220 Ladder Mesh Reinforcement by Hohmann & Barnard, Inc.
2. Coating : ASTM A153, Class B hot dipped galvanized, 1.50 oz. p.s.f.
3. Wire Size: Standard Weight: 9 gauge side rods x 9 gauge cross rods.
4. Sized for 8" and 12" nominal CMU.
5. Install 16" o.c. vertically.

D. Weld On Ties As Detailed – Refer to Structural and Architectural Details

2.02 CONTINUOUS SEISMIC WIRE

- A. Continuous Seismic Wire Placement: The continuous wire shall be installed a minimum of 1 5/8" from the interior (back) side into the masonry unit and allow a minimum of 5/8" coverage at the exterior (front) side of the masonry unit. As indicated in the figure below.

1. Wire Placement Figure:



2.03 THROUGH WALL FLASHING

- A. Equal to Cop-R-Cote, by Advanced Building Products, Inc.

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or

Coated Copper Flashings by Sandell's.

- B. Type: 3 layers, flexible flashing consisting of copper sheet coated on both sides with elastic asphalt compound.
- C. Characteristics: Waterproof, flexible at extreme temperatures, high tensile strength, resistant to mortar acid and alkali action, self-sealing at punctures and allowing minimum thermal cold flow through structure.
- D. Copper sheet: Full, single copper sheet weighing 5 ounces copper per square foot and complying with ASTM B370.
- E. Coating: Plasticized asphalt compound weighing 6 ounces per square foot minimum.
- F. Roll width: 36 inches.
- G. Utilize premanufactured interior corners, exterior corners, and end dams.
- H. Lap seams and seal seams with mastic. Mastic shall be a high-grade, asphalt based cement used in bonding asphalt-coated flashing to construction surfaces. To provide a strong, flexible waterproof barrier with adhesion allowing for expansion and contraction caused by temperature fluctuation or building movement.
- I. Follow manufacturer's installation recommendations.
- J. Coordinate with work performed under Section 07 27 26 – Fluid Applied Membrane Air Barriers, in regards to liquid flashing at termination bars, laps and seams.

2.04 OTHER ACCESSORIES

- A. Weeps: Full head joints required. Provide and install Hohmann & Bernard QV-Quadro-Vent or equal.
 - 1. Honeycomb design allowing passage of moisture from cavity to the exterior while restricting ingress of insects and other debris.
 - 2. Allowing passage of moisture up to its 2 ½" height.
 - 3. Suitable for top wall venting.
 - 4. Polypropylene construction
 - 5. Color: Clear
 - 6. Size: Standard (3/8" thick x 3 3/8" wide x 2 ½" tall)
- B. Provide and install "Z" Anchors at corners and intersections of CMU walls for lateral support. Minimum cross section shall be 1/4 inch by 1-1/2 inches with 2 inch bends. Anchor shall be at least 24 inches long and installed at a maximum spacing of 16" o.c. vertically or as noted or detailed on structural drawings. Hot dip galvanized.

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- C. Control Joints: Equal to VS Series PVC Control Joint by Hohmann & Barnard, Series 600 by Greenstreak, or 9101 Regular by Southern Construction Products, Inc.
- D. Mortar Net: Equal to Mortar Net, for cavity walls a high density polyethylene drainage system. 2" thick by 10" high. Install continuously at the base of all exterior walls and over all doors, windows, and openings.
- E. Through-wall flashing mastic: Fibrated, trowel grade mastic consisting of asphalt, mineral stabilizers, and interfibe complying with ASTM D2822, Type 1; Cop-R-Tite Flashing Mastic as manufactured by Advanced Building Products, Inc. or equal.
- F. Termination bars equal to Sandell's 1/8" x 1" stainless steel with pre-punched 1/4" dia. holes at 8" o.c.
- G. Stainless steel sub sill pans, end dams, drip edge and thru wall flashing at areas indicated on the drawings: Forged from 20 gauge stainless steel with welded and ground joints. Workmanship shall be smooth with no burrs or protrusions which could penetrate other materials.
- H. Flashing at door and window jambs.
 - 1. Extruded Aluminum (.070" thickness)
 - 2. Color to match door/window frames.
 - 3. Configurations as shown on drawings
 - 4. Attached to treated wood blocking with required corrosion resistant fasteners compatible with metal flashing.
 - 5. Seal to treated wood blocking with liquid flashing as described in Section 07 27 26 – Fluid-Applied Membrane Air Barriers. Cover all fasteners for a air-tight barrier.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Schedule a pre-installation conference with Architect and all trades.
- B. Successfully demonstrate the use of all products in mock-up wall.

3.02 REINFORCEMENT AND ANCHORAGE

- A. Install joint reinforcement at 16 inches o.c. each way.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend 16 inches minimum each side of opening.
- C. Place joint reinforcement continuous in first joint below top of walls.

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- D. Lap joint reinforcement ends minimum 6 inches. Extend 16 inches minimum each side of opening.
- E. Place reinforcing bars supported and secured against displacement. Maintain position within ½ inch of true dimension.
- F. Reinforce corners and intersections with pre-formed units of reinforcement at 16" o.c.
- G. Discontinue reinforcement and anchorage at expansion joints and control joints.
- H. Install "Z" Anchors at corners and intersections for lateral support. Minimum cross section of ¼" inch by 1 ½" inch with 2 inch bends. Anchor shall be at least 24 inches long and installed at a maximum spacing of 16" o.c. vertically as detailed or noted on structural drawings. Hot dip galvanized. Completely fill cells with mortar above and below strap.

3.03 CONCRETE FILLING AND GROUT (NEW CONSTRUCTION)

- A. Reinforce bond beam, pilasters, cells at doors, windows, and openings.
- B. Support and secure reinforcing bars. Maintain within ½ inch of dimensioned position.
- C. Do not displace reinforcing. Work into cores and cavities to eliminate voids.
- D. At bearing locations, fill side cores with concrete for a minimum 12 inches each side.
- E. Fill cores where "Z" anchors are installed.
- F. Fill cores at reinforced cells at exterior walls.

3.04 THROUGH-WALL FLASHING

- A. Coordinate installation of flashings with erection of masonry walls to ensure material is provided in timely manner for embedment in mortar joints.
- B. Coordinate with work performed under Section 07 27 26 – Fluid Applied Membrane Air Barriers, in regards to liquid flashing at termination bars, laps and seams.
- C. Inspection: Verify masonry surfaces to receive through-wall flashings are smooth, free of loose materials, and properly sloped to provide drainage.
- D. Verify that adequate weep holes and mortar deflection devices and thru wall flashing drip edges are being installed to provide proper drainage at flashing locations.
- E. Install flashings in accordance with Drawings, approved shop drawings, and manufacture's recommended installation instructions.
 - 1. Use recommended adhesive and sealer.
 - 2. Form end bans at all locations to provide positive drainage to weep holes.

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- F. Install copper flashings at all foundation sills, base of exterior walls, window and door sills and heads, through-wall conditions and other locations as detailed on drawings.
- G. Lap joints: Coat contacting surfaces with mastic and lap 6" inches minimum. Roll with hand roller until mastic bead appears at edges.
- H. After installation of flashings (and completion of masonry assemblies), inspect work.
 - 1. Verify flashings have been properly installed at all required locations to prevent water penetration.
 - 2. Verify weep holes have been provided to ensure proper drainage to exterior.
- I. Water test flashings as required by commissioning agency to verify flashing has been properly installed and moisture drains through weep holes. Refer to Division 17 for testing requirements.
- J. Extend flashing all the way through masonry course. Terminate at exterior with a visible drip edge.
- K. Trim exposed flashings flush with masonry surfaces after installation has been reviewed by the architect.

3.05 CONTROL AND EXPANSION JOINTS

- A. Install preformed control joint devices at all interior masonry walls, not to exceed 32'-0" o.c. Sealant and backer rod required.
- B. Locate control joints not to exceed 20'-o.c. or as indicated on exterior elevation drawings in exterior walls through both block and brick. Sealant and back rod required.

END OF SECTION

SECTION 04 21 00

BRICK MASONRY

PART 1 - GENERAL

1.01 FURNISH AND INSTALL THE FOLLOWING:

- A. Face brick.

1.02 RELATED WORK

- A. Section 01 21 00 – Allowances
- B. Section 04 05 13 – Masonry Mortaring
- C. Section 04 05 19 – Masonry Anchorage and Reinforcing
- D. Section 04 22 00 – Concrete Unit Masonry
- E. Section 05 50 00 – Metal Fabrications

1.03 ENVIRONMENTAL REQUIREMENTS

- A. Maintain materials and surrounding air temperature to minimum 50 degrees Fahrenheit, prior to, during, and for 48 hours after completion of masonry work. Comply with the International Masonry Industry All Weather Council, Recommended Practices and Guide Specifications for Cold Weather.

1.04 REFERENCES

- A. BIA (Brick Industry Association)
 - 1. www.bia.org

1.05 SUBMITTALS

- A. Test panels with project CMU and face brick required for Architect's and Owner's approval.
- B. Provide a 4'-0" x 4'-0" sample of complete wall system using all materials for Architect's approval on site.

PART 2 - PRODUCTS

2.01 FACE BRICK

- A. Refer to Section 01 21 00 – Allowances.

2.02 MORTAR

- A. Refer to Section 04 05 13 – Masonry Mortaring.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verify items provided by other Sections of work are properly sized and located. Take special care to coordinate masonry work with requirements of Division 15 and Division 16 of specifications.
- B. Establish lines, levels, and coursing. Protect from disturbance.
- C. Provide temporary bracing during erection of masonry work. Maintain in place until building structure provides permanent bracing.
- D. Review locations where waterproofing is required.

3.02 COURSING

- A. Place masonry to lines and levels indicated.
- B. Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.
- C. Lay brick masonry units in running bond. Form tooled concave mortar joints.
- D. Review control joint locations and configurations with Architect prior to initiating the work.

3.03 PLACING AND BONDING

- A. Lay masonry in full bed of mortar, properly jointed with other work. All joints, head, bed, and collar shall be completely filled. Buttering corners of joints and deep or excessive furrowing of mortar joints are not permitted.
- B. Fully bond intersections and external and internal corners.
- C. Do not shift or tap masonry units after mortar has taken initial set. Where adjustment must be made, remove mortar and replace.
- D. Remove excess mortar.
- E. Perform jobsite cutting with proper tools to provide straight, unchipped edges. Take care to prevent breaking masonry unit corners or edges.
- F. Weep holes (full head joint) required at bottom of all masonry walls, above all flashings, shelf, and angles, and lintels at 24" o.c. horizontally.

3.04 TOLERANCES AND AESTHETICS

- A. The Contractor must review the work as it progresses and review in areas not more than 100 s.f. per review. If the Contractor has any doubt that the work does not conform to tolerances or aesthetics, he shall stop the work and notify the Architect verbally and in writing immediately. The Architect or his authorized representative shall visit the site

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and review the area(s) in question with the Contractor within forty-eight (48) hours of the Contractor's written notice to the Architect. If the work is non-conforming, the Contractor shall remove all of the non-conforming work and immediately reconstruct the work using all new materials. If the project is delayed due to non-conforming work, the Contractor shall not be granted time extension(s).

- B. Variation from Unit to Adjacent Unit: 3/32 inch maximum.
- C. Variation from Plane of Wall: 1/4 inch in 10 feet; 1/2 inch in 20 feet or more.
- D. Variation from Plumb: 1/4 inch per story noncumulative.
- E. Variation from Level Coursing: 1/8 inch in 3 feet; 1/4 inch in 10 feet.
- F. Variation of Joint Thickness: 1/8 inch in 3 feet.
- G. Maximum Variation from Cross Sectional Thickness of Walls: Plus or minus 1/4 inch.

3.05 REINFORCEMENT AND ANCHORAGE

- A. See Section 04 05 19 – Masonry Anchorage and Reinforcing

3.06 CUTTING AND FITTING

- A. Cut and fit for pipes, conduit and sleeves. Cooperate with other sections of work to provide correct size, shape, and location. Take special care to coordinate work of this section with requirements of Division 15 and Division 16 of specifications.
- B. Obtain approval prior to cutting or fitting any area not indicated or where appearance or strength of masonry work may be impaired.

3.07 CLEANING

- A. Clean soiled surfaces with a non-acidic solution which will not harm masonry or adjacent materials. Consult masonry manufacturer for acceptable cleaners. Consult painting contractor and manufacturer of paint, primer, and elastomeric coatings to ensure that cleaning solutions are compatible with finishes.
- B. Use non-metallic tools in cleaning operations.

3.08 PROTECTION

- A. Provide protection without damaging completed work.
- B. At day's end, cover unfinished walls to prevent moisture infiltration.
- C. Keep masonry units covered and dry to prevent moisture infiltration during storage and construction.

3.09 LINTELS

- A. Install steel lintels over openings where brick veneer is scheduled.

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- B. Provide a minimum of 8 inch bearing on each side of opening.

3.10 CONTROL AND EXPANSION JOINTS

- A. See Section 04 05 19 – Masonry Anchorage and Reinforcing

END OF SECTION

SECTION 04 22 00
CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Concrete masonry units.
- B. Special Faced CMU (exterior accent).

1.02 RELATED WORK

- A. Section 04 05 13 – Masonry Mortaring
- B. Section 04 05 19 – Masonry Anchorage and Reinforcing
- C. Section 04 05 23 – Masonry Accessories
- D. Section 04 21 13 – Brick Masonry
- E. Section 05 50 00 – Metal Fabrications
- F. Section 07 27 26 Fluid-applied Membrane Air Barriers

1.03 ENVIRONMENTAL REQUIREMENTS

- A. Maintain materials and surrounding air temperature to minimum 50 degrees F. prior to, during, and 48 hours after completion of masonry work. Comply with the International Masonry Industry All Weather Council, Recommended Practices and Guide Specifications for Cold Weather.
- B. ASTM C90 – Latest Edition

1.04 REFERENCES

- A. National Concrete Masonry Association.

1.05 SUBMITTALS

- A. Test panels with project CMU and face brick required for Architect's and Owner's approval.
- B. Provide a 4'-0" x 4'-0" sample of complete wall system using all materials for Architect's approval on site.
- C. Provide color samples of Special Faced CMU for Owner's approval.

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PART 2 - PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete masonry units shall be in accordance with the requirements specified herein and the current issues of the following applicable specifications and standards:
1. Load-Bearing Concrete Masonry Units:
 - a. ASTM C90 Latest Edition.
 - b. Minimum compressive strength based on net cross-sectional area:
 - 1) Minimum 1700 psi for individual units.
 - 2) Minimum 1900 psi for average of three units.
 2. Special Faced CMU (exterior accent):
 - a. Equal to 4 x 8 x 16 Decrastone as manufactured by Smyrna Ready Mix Concrete, LLC.
 - b. Color: Selected by Owner.

2.02 CONCRETE MASONRY LINTELS, BOND BEAMS, AND EXTERIOR WALLS

- A. Lintels
1. 8" block walls

R.O. 0'-0" W to 5'-10" W	8" deep concrete filled bond beam w/2 #5's (one top, one bottom) and #3 stirrups at 16" o.c.
R.O. 5'-10" W to 8'-0" W	16" deep concrete filled bond beam w/1 #5 top, 1 #7 bottom, and #3 stirrups at 16" o.c.
 2. All lintels shall bear a minimum of 8" at each side.
 3. Refer to Structural Drawings.
- B. Bond Beams
1. 8" CMU walls 8" deep Concrete filled bond beam w/1 #5 top, 1 #5 bottom and #3 stirrups at 24" o.c.
 2. 8" CMU walls 16" deep Concrete filled bond beam w/1 #7 top, 1 #7 bottom and #3 stirrups at 24" o.c.
 3. Refer to Structural.
- C. Exterior Walls:

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1. At walls 13'-4" in height or less, install at 48" o.c. 1 - #6 rebar within a CMU cell from the grade beam to the highest bond beam. Fill with grout.
 2. At walls over 13'-4" in height and at gable end walls, install at 32" o.c. 1 - #6 rebar within a CMU cell from the grade beam to the highest bond beam. Fill with grout.
 3. Rebars shall be full height doweled into foundation/grade beam to fully develop in tension and doweled into bond beam. Bend 90 degrees into bond beam at top of wall with a min. 12" horizontal leg.
- D. Concrete: 3,500 psi @ 28 days; 8 - 10 inch slump.
- E. Grout: 2,500 psi @ 28 days; 8 - 10 inch slump.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verify items provided by other Sections of work are properly sized and located. Take special care to coordinate masonry work with requirements of Mechanical and Electrical.
- B. Establish lines, levels, and coursing. Protect from disturbance.
- C. Provide temporary bracing during erection of masonry work. Maintain in place until building structure provides permanent bracing.
- D. Review locations where waterproofing is required.

3.02 COURSING

- A. Place masonry to lines and levels indicated.
- B. Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.
- C. Lay concrete masonry units in running bond. Course one block unit and one mortar joint to equal 8 inches. Form tooled concave mortar joints.
- D. Review control joint locations and configurations with Architect prior to initiating the work.

3.03 PLACING AND BONDING

- A. Lay masonry in full bed of mortar, properly jointed with other work. All joints, head, bed, and collar shall be completely filled. Buttering corners of joints, and deep or excessive furrowing of mortar joints are not permitted.
- B. Fully bond intersections and external and internal corners. Fill cells in CMU supporting "Z" anchors with grout.

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- C. Do not shift or tap masonry units after mortar has taken initial set. Where adjustment must be made, remove mortar and replace.
- D. Remove excess mortar.
- E. Perform jobsite cutting with proper tools to provide straight, unchipped edges. Take care to prevent breaking masonry unit corners or edges.
- F. Weep holes (full head joint) required at bottom of all masonry walls, above all flashings, shelf, and angles, and lintels at 24" o.c. horizontally.

3.04 TOLERANCES AND AESTHETICS

- A. The Contractor must review the work as it progresses and review in areas not more than 100 s.f. per review. If the Contractor has any doubt that the work does not conform to tolerances or aesthetics, he shall stop the work and notify the Architect verbally and in writing immediately. The Architect or his authorized representative shall visit the site and review the area(s) in question with the Contractor within forty-eight (48) hours of the Contractor's written notice to the Architect. If the work is non-conforming, the Contractor shall remove all of the non-conforming work and immediately reconstruct the work using all new materials. If the project is delayed due to non-conforming work, the Contractor shall not be granted time extension(s).
- B. Variation from Unit to Adjacent Unit: 3/32 inch maximum.
- C. Variation from Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.
- D. Variation from Plumb: 1/4 inch per story noncumulative.
- E. Variation from Level Coursing: 1/8 inch in 3 feet; 1/4 inch in 10 feet.
- F. Variation of Joint Thickness: 1/8 inch in 3 feet.
- G. Maximum Variation from Cross Sectional Thickness of Walls: Plus or minus 1/4 inch.

3.05 REINFORCEMENT AND ANCHORAGE

- A. See Section 04 05 19 – Masonry Anchorage and Reinforcing.

3.06 CUTTING AND FITTING

- A. Cut and fit for pipes, conduit and sleeves. Cooperate with other sections of work to provide correct size, shape, and location. Take special care to coordinate work of this section with requirements of Section 15 and Section 16 of specifications.
- B. Obtain approval prior to cutting or fitting any area not indicated or where appearance or strength of masonry work may be impaired.

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3.07 CLEANING

- A. Clean soiled surfaces with a non-acidic solution which will not harm masonry or adjacent materials. Consult masonry manufacturer for acceptable cleaners. Consult painting contractor and manufacturer of paint, primer, and elastomeric coatings to insure that cleaning solutions are compatible with finishes.
- B. Use non-metallic tools in cleaning operations.

3.08 PROTECTION

- A. Provide protection without damaging completed work.
- B. At day's end, cover unfinished walls to prevent moisture infiltration.
- C. Keep masonry units covered and dry to prevent moisture infiltration during storage and construction.

3.09 LINTELS

- A. Install concrete masonry lintels over openings where steel lintels are not required.
- B. Provide a minimum of 8 inch bearing on each side of opening.

3.10 CONTROL AND EXPANSION JOINTS

- A. See Section 04 05 19- Masonry Anchorage and Reinforcing.

END OF SECTION

SECTION 05 12 23
STRUCTURAL STEEL

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Structural steel, embedded items, and miscellaneous steel.
- B. Fabrication shop coat painting.
- C. Steel erection.

1.02 RELATED SECTIONS

- A. Submittal Procedures
- B. Section 03 3113 Cast in Place Concrete
- C. Section 05 2119 Steel Joists
- D. Section 05 3123 Steel Roof Deck
- E. Section 05 5010 Metal Fabrications
- F. Section 09 2216 Metal Stud Framing System
- G. Section 09 9100 Paint
- H. Mechanical
- I. Electrical

1.03 REFERENCES

- A. ASTM A36 and ASTM A992 – Structural Steel.
- B. ASTM A53 – Hot-Dipped, Zinc-Coated Welded and Seamless Steel Pipe.
- C. ASTM A108 – Steel Bars, Carbon, Cold-Finished, Standard Quality.
- D. ASTM A123 – Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
- E. ASTM A307 – Carbon Steel Externally Threaded Standard Fasteners.
- F. ASTM A325 – High Strength Bolts for Structural Steel Joints.
- G. ASTM A500 – Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- H. ASTM A501 – Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

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- I. ASW A-2.0 – Standard Welding Symbols.
- J. AWS D1.1 – Structural Welding Code.
- K. AISC – Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings.
- L. SSPC – Steel Structural Painting Council.

1.04 SUBMITTALS

- A. Submittal Procedures
- B. Shop Drawings:
 - 1. Indicate sizes, spacing, and locations for structural members.
 - 2. Connections.
 - 3. Indicate welded connections with AWS A2.0 welding symbols. Indicate net weld lengths.
- C. Mill Test Reports: Submit indicating structural strength.
- D. Welders Certificates: Welders employed on this project shall have met AWS certification within the previous twelve (12) months.

1.05 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC – Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Structural Steel Members: ASTM A36 and ASTM A992.
- B. Structural Tubing: ASTM A500, Grade B.
- C. Pipe: ASTM A53, Grade B.
- D. Bolts, Nuts, and Washers: ASTM A325, galvanized to ASTM A123 for galvanized members.
- E. Anchor Bolts: ASTM F1554 Grade 36 unless otherwise stated by metal building manufacturer.
- F. Welding Materials: AWS D1.1; type required for materials being welded.
- G. Grout: Refer to Section 03600 for grout requirements.

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- H. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.
- I. Touch-Up Primer for Galvanized Surfaces: SSPC 20 Type I Inorganic.

2.02 FABRICATION

- A. Provide shop workmanship equal to the best modern practice conforming to listed industry standard and in accordance with the latest requirements of the American Institute of Steel Construction.
- B. In locations where structural steel is exposed to view, welds shall be contoured and blended; grind welds smooth for smooth architectural appearance.

2.03 FINISH

- A. Prepare structural component surfaces in accordance with SSPC SP2.
- B. Shop prime structural steel members. Do not prime surfaces that will be field welded, surfaces that will be in contact with concrete, or high-strength bolted connections.
- C. Galvanize to ASTM A123 structural steel members if indicated as such on drawings. Provide minimum 1.25 oz./sq.ft.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify with Architect that field conditions are acceptable and are ready to receive work.

3.02 ERECTION

- A. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- B. Field weld components indicated on drawings or shop drawings.
- C. Do not field cut or alter structural members without approval of Structural Engineer.
- D. After erection, prime all welds, abrasions, and surfaces not shop-primed or galvanized (except surfaces to be in contact with concrete).

3.03 ERECTION TOLERANCES

- A. Erection tolerances shall follow the recommendations of AISC.

END OF SECTION

SECTION 05 31 10
STEEL FLOOR DECKING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Steel deck and accessories.

1.02 REFERENCES

- A. AISI - Specification for the Design of Cold-Formed Steel Structural Members.
- B. ASTM A36 - Structural Steel.
- C. ASTM A525 - Steel Sheet, Zinc-Coated, Galvanized by Hot-Dip Process.
- D. ASTM A466 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality.
- E. ASTM A611 - Steel, Cold-Rolled Sheet, Carbon Structural.
- F. ASW D.1. - Structural Welding Code.
- G. SDI - Design Manual for Composite Decks, Form Decks, Roof Decks.

1.03 PERFORMANCE REQUIREMENTS

- A. Design metal decking in accordance with SDI Design Manual for Composite Decks, Form Decks, Roof Decks.

1.04 SUBMITTALS

- A. Shop Drawings: Indicate decking plan, support locations, projections, openings and reinforcement, pertinent details, and accessories. Identify all conditions using /requiring steel sheet closure and edge angles.
- B. Product Data: Provide deck profile characteristics and dimensions, structural properties, and finishes.
- C. Manufacturer's Installation Instructions: Indicate specific installation sequence.

1.05 DELIVERY AND HANDLING

- A. Store and protect products from damage.
- B. Cut plastic wrap to encourage ventilation.
- C. Separate sheets and store decking on dry wood sleepers; slope for positive drainage.

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PART 2 - PRODUCTS

2.01 MATERIALS

- A. Sheet Metal: ASTM A446, Grade A Structural Quality; with G90 galvanized coating conforming to ASTM A525.
- B. Bearing Plates: ASTM A36 steel.
- C. Welding Materials: AWS D1.1.
- D. Touch-Up Primer: Zinc Chromate Type.

2.02 FABRICATION

- A. Metal Decking: Sheet steel, configured as follows:
- B. Span Design: Multiple
- C. Nominal Height: See drawings.
- D. Metal Closure Strips, Cover Plates, and Related Accessories: 20 gauge galvanized sheet steel; of profile and size as required.
- E. Fasteners: Galvanized hardened steel, steel-tapping.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means installer accepts existing conditions.

3.02 INSTALLATION

- A. Erect metal decking in accordance with SDI Design Manual for Composite Decks, Form Decks, Roof Decks.
- B. Bear decking on supports with 1 5/8 inch minimum bearing. Align and level.
- C. Metal deck shall be installed in strict compliance with manufacturer's requirements. Attach deck to supporting steel per Structural drawings.
- D. Install sheet steel closures and angle flashings to close openings between deck and walls, columns, and openings.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Lintels.
- B. Metal railings.
- C. Angles and braces.
- D. Metal stairs.

1.02 RELATED WORK

- A. Section 09 91 00 – Painting

1.03 REFERENCES

- A. ASTM A36 and ASTM A992 – Structural Steel.
- B. ASTM A53 – Hot-Dipped, Zinc-Coated Welded and Seamless Steel Pipe.
- C. AWS D1.1 – Structural Welding Code.
- D. FS TT-P-31 – Paint, Oil: Iron Oxide, Ready Mix, Red and Brown.

1.04 SHOP DRAWINGS

- A. Submit a digital copies of shop drawings.
- B. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Verify field measurements prior to submission of shop drawings to Architect.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Steel Sections: ASTM A36 and ASTM A992.
- B. Bolts, Nuts, and Washers: ASTM A325 Bolts.
- C. Welding Materials: AWS D1.1; type required for materials being welded.
- D. Primer: FS TT-P-31, Red, for shop application and field touch-up.

2.02 METAL FABRICATIONS

- A. Lintels:

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1. For Openings with Clear Span of 4'-0" (Maximum): 3-1/2" x 3-1/2" x 5/16".
 2. For Openings with Clear Span of 6'-0"(Maximum): 4" x 3-1/2" x 5/16".
 3. For Openings with Clear Span of 8'-0" (Maximum): 5" x 3-1/2" x 5/16".
 4. Refer to Structural Drawings.
- B. Pipe bollards: 6 inch diameter, steel pipe with 6" diameter steel sphere (equal to Lawler LS-1556) welded on top of steel closure plate cap.
- C. Railings:
1. Exterior handrails shall be hot dipped galvanized (no paint finish).
 2. As shown on Drawings.
- D. Miscellaneous angles and bracing:
1. As shown on Drawings and as required by mechanical and electrical equipment.

PART 3 - FINISH

3.01 PREPARATION

- A. Obtain Architect's approval prior to site cutting or making adjustments not scheduled.
- B. Clean and strip site-primed steel items to bare metal where site welding is scheduled.
- C. Make provisions for erection loads with temporary bracing. Keep work in alignment.
- D. Supply items required to be cased into concrete or embedded in masonry with setting templates to appropriate sections.

3.02 FABRICATION

- A. Verify dimensions on site prior to shop fabrication.
- B. Fabricate items with joints tightly fitted and secured.
- C. Fit and shop assemble in largest practical sections, for delivery to site.
- D. Grind exposed welds flush and smooth with adjacent finished surface. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of structure, except where specifically noted otherwise.
- F. Make exposed joints butt tight, flush, and hairline.
- G. Supply components required for anchorage of metal fabrications. Fabricate anchorage and related components of same materials and finish as metal fabrication, except where

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specifically noted otherwise. Supply sleeves as required for mounting of newel posts in concrete.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Perform field welding in accordance with AWS D1.1.
- C. After installation, touch up field welds, scratched or damaged surfaces with primer.

3.04 FINISH

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact bond with concrete or where field welding is required.

END OF SECTION

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Blocking.
 - 2. Nailers.Related Sections
- B. Related sections
 - 1. Section 06 20 00 – Finish Carpentry
 - 2. Section 06 41 13 – Wood Veneer Faced Architectural Cabinets
 - 3. Section 10 57 23 – Closet and Utility Shelving

1.02 REFERENCES

- A. MIL-L-1914-C Lumber and Plywood, Fire Retardant Treated.
- B. MIL-V-13518C (1) Wood Preservatives: Tetrachlorophenol and Pentachlorophenol, Surface Sealing Compound.
- C. PS 1 – Construction and Industrial Plywood.
- D. PS 20 – American Softwood Lumber Standard.
- E. NFPA – National Design Specification for Wood Construction.
- F. National Forest Products Association National Design Specification for Wood Construction.

1.03 QUALITY ASSURANCE

- A. Rough Carpentry Lumber: Visible grade stamp, of agency certified by National Forest Products Association (NFPA).

1.04 JOB CONDITIONS

- A. Contractor must examine the substrates and supporting structure and the conditions under which the carpentry work is to be installed and must notify the Architect of conditions detrimental to the work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer and the Owner. Initiation of installation indicates acceptance of substrate and existing conditions.

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1.05 COORDINATION

- A. Take special care to furnish and install solid wood blocking for secure mounting of all bathroom and restroom accessories, wall cabinets, clothing hang-rod brackets, and other wall-mounted and ceiling-mounted items.

PART 2 - PRODUCTS

2.01 ROUGH CARPENTRY MATERIALS

- A. Structural light framing: No. 2 grade.
- B. Miscellaneous Framing, Nailers, and Blocking: No. 2 grade.
- C. Wood Studs: 2 x 4 and 2 x 6 at 16" o.c., or as designated in the Drawings.
- D. Nails, Spikes, and Staples: Galvanized for exterior locations, high humidity locations, and treated wood; plain finish for other interior locations; size and type to suit application.
- E. Bolts, Nuts, Washers, Lags, Pins, and Screws: Medium carbon steel sized to suit application; galvanized for exterior locations, high humidity locations, and treated wood; plain finish for other interior locations.
- F. Fasteners: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to steel. Provide and install all anchors, nails, inserts, blocking, grounds, and other carpentry items. Anchor bolts, nuts, and washers and other anchors to concrete and masonry to be zinc-coated.

2.02 WOOD TREATMENT

- A. Wood Preservative: Copper quaternary preservative or copper azole.
 - 1. Equal to:
 - a. NatureWood by Osmose, Inc., 1016 Everee Inn Road, Griffin, Georgia 30224; telephone: (770) 233-4200; fax: (770) 229-5225.
 - b. Preserve by Viance, LLC, 200 East Woodlawn Road, Suite 350, Charlotte, North Carolina 28217-2303; telephone: (800) 421-8661; fax: (704) 527-8232.
 - c. Wolmanized by Lonza Wood Protection (formerly known as Arch Wood Protection), 5660 New Northside Drive, Suite 1100, Atlanta, Georgia 30328; telephone: (678) 627-2000.
 - 2. Retention Rate: 0.40 pcf.
- B. Fastener and Connectors:
 - 1. All fasteners shall be hot-dipped galvanized meeting ASTM A153.

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- 2. All connectors shall be hot-dipped galvanized meeting ASTM A65 Class G185 Sheet.
- 3. Or better, such as stainless steel 304 or 306.
- C. Horizontal wood members with any part to be placed less than 24" from finished grade or in contact with masonry shall be pressure preservatively treated.
- D. All wood nailing blocks and strips for securing flashing and roofing shall be preservatively treated.

PART 3 - EXECUTION

3.01 FURRING AND STRIPPING

- A. Erect wood stripping and nailing members true to lines and levels. Do not deviate from true alignment more than 1/4".
- B. Space members at 16" o.c. or as indicated on drawings.
- C. Construct members of continuous pieces of longest possible lengths.

3.02 COORDINATION

- A. Ensure that mechanical and electrical items affecting this Section of work are properly placed and complete prior to commencement of installation.

3.03 WOOD BLOCKING

- A. Furnish and install solid wood blocking as required for secure mounting of base and wall cabinets, and fire extinguisher cabinets.
- B. Furnish and install solid wood blocking as required for secure mounting of equipment of Division 21, 22, 23, 26, 27 and Division 28 of specifications.
- C. Furnish and install solid wood blocking as required for secure mounting of all utility shelving standards.
- D. Furnish and install solid wood blocking for toilet compartments.
- E. Furnish and install solid wood blocking for restroom accessories.

3.04 PROTECTION

- A. Cover all sheathing, decking, and subfloor with 30 pound asphalt-impregnated felt for temporary protection from the elements.

END OF SECTION

SECTION 06 20 00
FINISH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Interior and exterior finish carpentry.
- B. Related Sections
 - 1. Section 06 10 00 – Rough Carpentry
 - 2. Section 09 65 13.13 – Resilient Base
 - 3. Section 09 93 00 – Stains and Transparent Finishing
 - 4. Section 12 36 23 – Plastic Countertops
 - 5. Section 12 36 61.13 – Solid Surfacing Countertops

1.02 REFERENCES

- A. PS 1 – Construction and Industrial Plywood.
- B. PS 20 – American Softwood Lumber Standard.
- C. PS 51 – Hardwood and Decorative Plywood.
- D. PS 58 – Basic Hardwood.
- E. NFPA – National Design Specification for Wood Construction.
- F. Quality Standards of Architectural Woodwork Institute (AWI).
- G. National Forest Products Association National Design Specification for Wood Construction.

1.03 QUALITY ASSURANCE

- A. Fabricate site-made finish carpentry items in accordance with recommendations of Quality Standards of Architectural Woodwork (AWI).

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver shop-fabricated carpentry items until site conditions are adequate to receive the work. Protect items from weather while in transit.
- B. Store finish carpentry items indoors, in ventilated areas with a constant, minimum temperature of 60 degrees Fahrenheit, maximum relative humidity of 25 to 55 percent.

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1.05 JOB CONDITIONS

- A. Contractor must examine the substrates and supporting structure and the conditions under which the carpentry work is to be installed, and notify the Architect of conditions detrimental to the work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer and the Architect. Initiation of installation indicates acceptance of substrate and existing conditions.

PART 2 - PRODUCTS

2.01 FINISH CARPENTRY

- A. Trim: Solid 1x material of number one fir or redwood.
- B. Nails: Size and type to suit application.
- C. Adhesive: As recommended by plastic laminate manufacturer.
- D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Size and type to suit application.
- E. Softwood Lumber: PS 20; graded in accordance with the requirements of AWI; maximum moisture content of 6 percent for interior work and 10 percent for exterior work.

PART 3 - EXECUTION

3.01 CONSTRUCTION

- A. Erect wood members true to lines and levels. Do not deviate from true alignment more than 1/4 inch.
- B. Construct members of continuous pieces of longest possible lengths.
- C. Sand work smooth and set exposed nails. Apply wood filler in exposed nail indentations and leave ready to receive site applied finishes. On items to receive transparent finishes, use wood filler which matches surrounding surfaces and of types recommended for applied finishes.
- D. Preservative treat surfaces in contact with cementitious materials.
- E. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fitments. Verify locations and sizes of cutouts from site dimensions and approved submittals. Seal contact surfaces of cutouts.

3.02 INSTALLATION

- A. Use purpose-designed fixture attachments for mounted components.
- B. When necessary to cut and fit on site, make material with ample allowance for cutting. Provide trim for scribing and site cutting.

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- C. Countersink semi-concealed anchorage devices used to wall mount components and conceal with solid plugs of species to match surrounding wood. Place flush with surrounding surfaces.
- D. Ensure that mechanical and electrical items affecting this Section of work are properly placed and complete prior to commencement of installation.

END OF SECTION

SECTION 06 41 13

WOOD-VENEER-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Interior cabinets.

1.02 REFERENCES

- A. PS 1 – Construction and Industrial Plywood.
- B. PS 20 – American Softwood Lumber Standard.
- C. PS 51 – Hardwood and Decorative Plywood.
- D. PS 58 – Basic Hardwood.
- E. NFPA – National Design Specification for Wood Construction.
- F. Quality Standards of Architectural Woodwork Institute (AWI).
- G. National Forest Products Association National Design Specification for Wood Construction.

1.03 QUALITY ASSURANCE

- A. Fabricate cabinetwork and site-made finish carpentry items in accordance with recommendations of Quality Standards of Architectural Woodwork (AWI).

1.04 SUBMITTALS

- A. Submit shop drawings of cabinets and millwork items. Indicate location and dimensions. Contractor shall verify all field dimensions applicable to cabinets and millwork.
- B. Furnish samples of plastic laminate to Architect for color selection by the owner.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver shop-fabricated carpentry items until site conditions are adequate to receive the work. Protect items from weather while in transit.
- B. Store finish carpentry items indoors, in ventilated areas with a constant, minimum temperature of 60 degrees F., maximum relative humidity of 25 to 55 percent.

1.06 JOB CONDITIONS

- A. Contractor must examine the substrates and supporting structure and the conditions under which the carpentry work is to be installed, and notify the Architect of conditions detrimental to the work. Do not proceed with the installation until unsatisfactory

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conditions have been corrected in a manner acceptable to the installer and the Architect.
Initiation of installation work indicates acceptance of substrate and existing conditions.

1.07 COORDINATION

- A. Take special care to furnish and install solid wood blocking at steel stud partitions for secure mounting of all bathroom and restroom accessories, wall cabinets, clothing hang-rod brackets and other wall and ceiling mounted items.
- B. Keying requirements at cabinet doors/drawers that are scheduled to receive locks shall be reviewed and approved by the Owner to insure coordination.

PART 2 - PRODUCTS

2.01 CABINETS

- A. General Requirements
 - 1. Face frames: 3/4 inch.
 - 2. Ends/Divisions: 5/8 inch.
 - 3. Shelves, tops and bottoms: 3/4 inch.
 - 4. Backs: 1/4 inch.
 - 5. Door faces/drawer fronts: 3/4 inch flush slabs.
 - 6. Drawer slides: Equal to Metabox system.
 - 7. All shelves shall be adjustable; maximum span: 32 inches.
 - 8. Drawer/cabinet pulls: ADA 4" inch wire pulls, brushed aluminum
 - 9. Cabinet door hinges: Equal to Blum, 110 degree, self-closing, screw on type.
 - 10. Cabinet locks: Equal to National at locations as shown on Drawings.
- B. Finishes:
 - 1. Fabricate specific millwork as noted on Drawings of birch plywood. Clear finish or painted as selected by the owner required. Veneer edge banding required.
 - 2. Cap exposed edges and ends with PVC edging to match finish and pattern of other cabinets.
 - 3. All plywood surfaces shall receive one coat of sanding sealer and two coats of satin polyurethane. This includes all plywood, clear, and/or transparent finishes.
- C. Special Requirements:

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1. All base cabinets shall be standard 24" depth, unless shown otherwise on Drawings.
2. All wall cabinets shall be standard 12" depth.
3. Rubber cove base (4") required at all base cabinets. Coordinate toe space dimensions with work of Section 09 65 19.
4. Screw strips at cabinets shall be finished with matching laminate at all exposed surfaces.
5. Provide and install finishing grommets for wire passage (telephone and countertop office equipment) at countertops. Coordinate locations with electrical subcontractor.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Sand work smooth and set exposed nails. Apply wood filler in exposed nail indentations and leave ready to receive site applied finishes. On items to receive transparent finishes, use wood filler which matches surrounding surfaces and of types recommended for applied finishes.
- B. Seal and varnish concealed and exposed plywood surfaces. Shop finish with spray equipment.
- C. Preservative treat surfaces in contact with cementitious materials.
- D. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and other fixtures and fitments. Verify locations and sizes of cutouts from site dimensions and approved submittals. Seal contact surfaces of cutouts.

3.02 INSTALLATION

- A. Set and secure cabinetwork items in place rigid, plumb and square.
- B. Use purpose designed fixture attachments for mounted components.
- C. Use threaded steel concealed joint fasteners to align and secure adjoining cabinet units and counter tops.
- D. When necessary to cut and fit on site, make material with ample allowance for cutting. Provide trim for scribing and site cutting.
- E. Permanently fix cabinet and counter bases to floor using appropriate angles and anchorages. All cabinets and millwork shall be installed plumb, square and level.
- F. Counter-sink semi-concealed anchorage devices used to wall mount components and conceal with solid plugs of species to match surrounding wood. Place flush with surrounding surfaces.

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- G. Install and adjust cabinet hardware to correct operation.
- H. Ensure that mechanical and electrical items affecting this Section of work are properly placed and complete prior to commencement of installation. Take special care to coordinate lavatory cut-outs with plastic laminate countertop construction.

END OF SECTION

SECTION 07 21 00
BUILDING INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes

1. Fiberglass batt thermal insulation above ceilings of all heated/cooled spaces.
2. Fiberglass batt thermal insulation at all exterior stud walls.
3. Fiberglass sound batt acoustical insulation at all new interior partition walls.
4. Rigid insulation at all CMU and masonry veneer walls and exterior stud walls.

B. Related Sections

1. Section 04 21 13 – Brick Masonry
2. Section 04 22 00 – Concrete Unit Masonry
3. Section 06 10 00 – Rough Carpentry
4. Section 07 27 26 – Fluid-Applied Membrane Air Barriers

1.02 SUBMITTAL REQUIREMENTS

- A. Submit detailed product information that confirms thermal performance characteristics of fiberglass insulation products specified herein.
- B. Insulation must be UL certified to have a flame spread of 25 or less.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Ceiling Thermal Insulation: Fiberglass batt insulation, unfaced, R-19, equal to Owens-Corning, above all ceilings.
- B. Exterior wall Thermal Insulation: Fiberglass batt insulation, unfaced, R-11, equal to Owens-Corning at all 3-5/8" exterior stud walls, and R-19 at all 6" exterior stud walls.
- C. Acoustical Insulation: Fiberglass batt sound attenuation blankets at all new interior drywall partitions. (3-1/2" and 6" in applicable walls.)
- D. Cavity wall insulation: Equal to Dow Styrofoam, cavity mate. Attach with manufacturer's approved construction adhesive at stud walls, verify and coordinate that adhesive and fluid applied air whether barrier is compatible. Tape all joints with Dow Styrofoam brand 3" wide all-purpose tape.

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PART 3 - EXECUTION

3.01 PREPARATION

- A. Verify adjacent materials are dry and ready to receive insulation.
- B. Verify mechanical and electrical services within plenum have been installed and tested.

3.02 INSTALLATION

- A. Install fiberglass insulation in accordance with manufacturer's instructions.
- B. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.
- C. Take special care to insure that plane of insulation is continuous; leave no gaps or voids.
- D. Ensure that dampproofing and rigid insulation are compatible.
- E. Utilize construction adhesive to secure rigid insulation at cavity walls.

END OF SECTION

SECTION 07 26 16

BELOW GRADE VAPOR BARRIER (15 MIL)

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Multi-layer plastic extrusion vapor barrier/retarder beneath all building slabs, footings, and sides of footings.
- B. Note: This product is shown on drawings as a vapor barrier beneath building slabs.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Plastic extrusion sheet not less than 15 mils thick.
- B. Use a vapor retarder which meets all criteria for Class A per ASTM E1745-97.
- C. Vapor Barrier shall have all the following qualities:
 - 1. Maintain permance of less than 0.01 Perms [grains/(ft² · hr · inHg)] as tested in accordance with mandatory conditioning test per ASTM E1745 Section 7.1 (7.1.1.7.1.5).
 - 2. Other performance criteria:
 - a. Strength: ASTM E1745 Class A.
 - b. Thickness: 15 mils minimum
 - 3. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1
 - 4. Warranty: (a) compliance with the designated ASTM E1745 classification, and (b) no manufacturing defects in the product for, at least, the Life of the Building.
- D. Vapor barrier products:
 - 1. Basis of Design: Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC., (877) 464-7834 www.stegoindustries.com
 - 2. Vaporguard by Reef Industries, 713-507-4250. www.reefindustries.com
 - 3. Moistop Ultra 15 by Fortifiber, (800) 773-4777. <https://www.fortifiber.com/product/moistop-ultra-15/>
- E. Products shall be equal to Vapor Block 15 by Raven Industries, Griffolyn Division, or Stego 15 Mil A by Stego Industries.

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1. Membrane.
2. Tape.
3. Mastic.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install vapor barrier in accordance ASTM E1643.
 1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
 2. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, water stops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.
 - a. Seal vapor barrier to the entire slab perimeter using manufacturer's textured tape with a surface that creates a mechanical seal to freshly-placed concrete, per manufacturer's instructions.
 3. Overlap joints 6 inches and seal with manufacturer's seam tape.
 4. Apply seam tape/textured tape/double-sided tape to a clean and dry vapor barrier.
 5. Seal all penetrations (including pipes) per manufacturer's instructions.
 6. Avoid the use of stakes driven through vapor barrier by utilizing screed and forming systems that will not leave punctures in the vapor barrier.
 7. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.

END OF SECTION

SECTION 07 27 26
FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Materials and installation for fluid-applied membrane to provide an air barrier component and secondary water-resistive barrier/drainage plane for unit masonry and sheathing wall assemblies.
- B. The intent of this section is to ensure that the building envelope is sealed and airtight. Continuous barriers shall be installed over all exterior wall back-up systems that are exposed to the wall cavity. Use accessories as required at dissimilar materials to ensure that air/weather barrier forms a continuous coating.

1.02 RELATED SECTIONS

- A. Section 03 33 00 – Cast-In-Place Concrete
- B. Section 04 05 19 – Masonry Anchorage and Reinforcing
- C. Section 07 21 00 – Building Insulation
- D. Section 07 92 00 – Joint Sealant
- E. Section 09 29 02 – Exterior Gypsum Sheathing

1.03.1 REFERENCES

- A. ASTM Standards
 - 1. C 297 Test Method for Tensile Strength of Flat Sandwich Constructions in Flatwise Plane
 - 2. D 522 Test Methods for Mandrel Bend Test of Attached Organic Coatings
 - 3. D 882 Test Methods for Tensile Properties of Thin Plastic Sheeting
 - 4. D 2247 Practice for Testing Water Resistance of Coatings in 100 percent Relative Humidity
 - 5. D 3273 Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
 - 6. E 84 Test Method for Surface Burning Characteristics of Building Materials
 - 7. E 96 Test Methods for Water Vapor Transmission of Materials

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8. E 283 Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
 9. E 330 Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
 10. E 331 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
 11. E 1233 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential
 12. E2178
- B. Building Code Standards
1. SBCCI PST & ESI Evaluation Guide on Floor, Wall, and Roof Systems (Testing for Moisture Protection Barriers), Evaluation Guide 119.
 2. UBC 26-9, Method of Test for the Evaluation of Flammability Characteristics of Exterior, Nonload-Bearing Wall Assemblies Containing Combustible Components Using the Intermediate-Scale, Multistory Test Apparatus
 3. ICBO Acceptance Criteria for Exterior Insulation and Finish Systems, AC 24
 4. CCMC Technical Guide on Air Barriers
- C. Gypsum Association
1. GA-600 Fire Resistance Design Manual
 2. GA-253 Recommended Specifications for the Application of Gypsum Sheathing
 3. GA-254 Fire Resistant Gypsum Sheathing
- D. American Plywood Association
1. E30 Residential and Commercial Construction Guide
- E. Proprietary Specifications
1. 531544 Georgia-Pacific Corporation, “Dens Glass Gold® Exterior Sheathing”
 2. AATCC (American Association of Textile Chemists and Colorists), Test Method 127, Water Resistance: Hydrostatic Pressure Test
- F. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE)
1. 2001 ASHRAE Handbook-Fundamentals

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1.04 DESIGN REQUIREMENTS

- A. Deflection Criteria: Maximum allowable deflection normal to the plane of the wall:
L/240
- B. Wind Load: conform with code requirements.
- C. Moisture Control:
 - 1. Minimize condensation within the assembly.
 - 2. Drain water directly to the exterior where it is unlikely to penetrate components in the wall assembly (windows and doors, for example).
 - 3. Provide flashing to direct water to the exterior in accordance with code requirements, including, above window and door heads, beneath window and door sills, at roof/wall intersections, decks, intersections of lower walls with higher walls, and at the base of the wall.
- D. Air Barrier Continuity: provide continuous air barrier system of compatible air barrier components.
- E. Mechanical Ventilation: maintain pressurization and indoor humidity levels in accordance with recommendations of ASHRAE (see 2001 ASHRAE Handbook—Fundamentals).

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1.05 PERFORMANCE REQUIREMENTS

A. PROSOCO R-GUARD™ Water-Resistive/Air Barrier Performance Data

Test	Method	Criteria	Results
Aging Water Penetration Resistance	AATCC127 (Water Column)	Resist 21.6 in (55 cm) water for 5 hours before and after aging.	No water penetration before and after aging. No water penetration at 332 inches (843cm) head of water before aging.
Structural Loading Water Penetration Testing	ASTM E 1233 ASTM E 331	No water at exterior plane of sheathing (exterior gypsum, Dens-Glass Gold, plywood, OSB) after 10 cycles at 80% design load and 75 minutes water spray at 6.24 psf (299 Pa) pressure differential with water spray rate of 5 gal/ft ² -hr (3.4 L/m ² -min).	No water penetration before and after aging. No water penetration at 332 inches (843cm) head of water before aging.
Cyclic Pressure Water Penetration Testing	ASTM E 283 ASTM E 331	No water penetration or evidence of elevated moisture levels in plywood sheathing after 10 cycles of conditioning at 299 Pa (6.24 psf) positive and negative pressure followed by 75 minutes water spray at 6.24 psf (299 Pa) pressure differential with water spray rate of 5 gal/ft ² -hr (3.4 L/m ² -min).	No water penetration before and after aging. No water penetration at 332 inches (843cm) head of water before aging.
Water Penetration R-GUARD™ Spray Wrap (8-in medium wt CMU w/2 coats)	ASTM E 331	No leakage at 137 Pa (2.86 psf) for 15 minutes	No leakage at 137 Pa (2.86 psf) for 15 minutes. No leakage at 300 Pa (6.24 psf) for 120 minutes.
Water Resistance Testing	ASTM D 2247	Absence of deleterious effects after 14-day exposure.	No visible deleterious effects after 14-day exposure.
Resistance to Mold Growth	ASTM D 3273	No mold growth after 28 days.	No mold growth after 28-day exposure.
Freeze/Thaw Resistance	ICBO Method (AC 24)	No visible effects (cracking, checking, delamination, erosion) when viewed at 5x.	No visible deleterious effects when viewed at 5x.
Water Vapor Transmission	ASTM E 96 Method B (Water Method)	Measure.	R-GUARD™ Fill: 17.3 perms [(994 ng/(Pa s m ²))] R-GUARD™ Spray Wrap: 5.7 perms [(327 ng/(Pa s m ²))]
Air Leakage: Wall Assembly with R-GUARD™ Fill and R-GUARD™ Spray Wrap	ASTM E 283 (SBCCI PST & ESI Method)	<0.06 cfm/ft ² at 1.57 psf (0.00030 m ³ /s m ² at 75 Pa)	0.0044 cfm/ft ² (0.000022 m ³ /s m ²)
Air Leakage: R-GUARD™ Fill	ASTM E 283 (CCMC Technical Guide Method)	<0.003 cfm/ft ² at 1.57 psf (<0.02 L/s m ² at 75 Pa)	0.0002 cfm/ft ² (0.0014 L/s m ²)

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Air Leakage: R-GUARD™ Spray Wrap (8-in medium wt CMU w/2 coats)	ASTM E 283 <i>(as specified in ASTM E 2178 Section 8.2.8)</i>	<0.004 cfm/ft ² air leakage at 1.57 psf <0.02 L/s m ² air leakage at 75 Pa	<0.004 cfm/ft ² air leakage at 1.57 psf, <0.004 cfm/ft ² air leakage at 6.24 psf <0.02 L/s m ² air leakage at 75 Pa <0.02 L/s m ² air leakage at 300 Pa
Structural Integrity	ASTM E 330	2-in (51mm) water pressure (positive and negative) for one hour.	No loss of structural integrity.
Dry Tensile Strength	ASTM D 882	20 lbs/in (3503 N/m) minimum before and after aging.	R-GUARD™ Fill: 159 pli (27.8 kN/m) before aging. 213 pli (37.3 kN/m) after aging.
Flexibility	ASTM D 522	No cracking or delamination using 1/8-in (3mm) mandrel at 14°F (-10°C) before and after aging.	No cracking or delamination before or after aging.
Tensile Adhesion	ASTM C 297	>15 psi (103 kPa)	Gypsum (ASTM C 79): >30 psi (206 kPa) Gypsum (ASTM C 1177): >30 psi (206 kPa) Exposure 1 OSB: >50 psi (344 kPa) Exterior Plywood: >90 psi (620 kPa)
Surface Burning	ASTM E 84	Flame Spread <25 Smoke developed: <450	Flame Spread: 5 Smoke Developed: 10 NFPA Class A, UBC Class 1 building material
Fire Testing	UBC 26-9, NFPA 285	No increase in fire hazard.	Pass.

1.06 SUBMITTALS

- G. Product Data: Submit manufacturer's product data sheets on all products to be used for project construction. Submit description for protection, surface preparation and application.
- H. Contractor Qualifications: Submit qualifications of Contractor.
- I. Samples for approval as directed by Architect or Owner.

1.07 QUALITY ASSURANCE

- A. Contractor requirements:
 - 1. Knowledgeable in the proper use and handling of PROSOCO products.
 - 2. Employ skilled installers who are experienced and knowledgeable in air and water resistive barrier application, and familiar with the requirements of the specified work.
 - 3. Provide the proper equipment, manpower and supervision on the job site to install the system in compliance with PROSOCO's published specifications.

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- B. Project Meeting: Convene a pre-application meeting two weeks before the start of installation of fluid-applied membrane air barrier. Require attendance of parties directly affecting the work of this section, including the Contractor, Architect, and PROSOCO representative. Review Mock-Up procedures.
- C. Field Constructed Mock- Up procedures: Prior to overall installation, apply air and water-resistive barrier system to mock-up wall, verify details for overall installation. Demonstrate tie-ins with adjoining construction and other termination conditions.
 - 1. junction with roof system, foundation wall, and typical penetrations and gaps; Illustrating materials interface and seals.
 - 2. Install air and water-resistive barrier mock-ups in the field on assemblies constructed of unit masonry or sheathing. Use the manufacturer's written application instructions.
 - 3. Mock-ups must remain available for inspection, testing and approval throughout the project.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in their original sealed containers bearing the manufacturer's name and identification of product.
- B. Protect coatings (pail products) from freezing temperatures and temperatures in excess of 90 degrees F (32 degrees C). Store away from direct sunlight.

1.09 PROJECT/SITE CONDITIONS

- A. Maintain ambient and surface temperatures above 40 degrees F (4 degrees C) and below 100-degree F (38 degrees C) during application and drying period, minimum 24 hours after application of air and water-resistive barrier.
- B. Provide supplementary heat for installation in temperatures less than 40 degrees F (4 degrees C) or if surface temperature is likely to fall below 40 degrees F (4 degrees C).
(Note: surface temperature is lower than air temperature at night).

1.10 COORDINATION/SCHEDULING

- A. Coordinate installation of foundation waterproofing, roofing membrane, windows, doors, and other wall penetrations to provide a continuous air and water resistive barrier.
- B. Provide protection of rough openings before installing windows, doors, and other penetrations through the wall.
- C. Provide sill flashing for directing water to the exterior before windows and doors are installed.
- D. Install window and door head flashing immediately after windows and doors are installed.

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- E. Install diverter flashings wherever water can enter the assembly for directing water to the exterior.

1.11 QUALITY ASSURANCE

- A. Mock-Up: Supply sufficient quantity of material for use in constructing mock-up panel as specified in Section 014339 mock-ups

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Prosoco, Inc. "R" Guard (**BASIS of DESIGN**)
- B. Grace (Perma Barrier)
- C. Carlisle
- D. Tremco
- E. Sandelle

2.02 FLUID-APPLIED MEMBRANE AIR BARRIERS

- A. Equal to PROSOCO R-Guard MVP
 - 1. Fluid applied air and water-resistive barrier that stops air and water leakage in cavity wall, masonry veneer construction.
 - 2. ICC-ES AC 212 Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers Over Exterior Sheathing.
 - 3. ABAA: Air Barrier Association of America Acceptance Criteria for Liquid Applied Membranes.
 - 4. Comply with national, state and district AIM VOC regulations and be 30 g/L or less.
 - 5. Water vapor transmission: 34 perms when tested in accordance with ASTM E96 (Wet Cup).
 - 6. Tensile bond: Minimum 15 psi or exceeds strength of substrate when tested in accordance with ASTM C297.
 - 7. Surface burning characteristics: Class A Building Material, when tested in accordance with ASTM E84. Flame Spread: Less than or equal to 25, Smoke Developed: Less than or equal to 450.
 - 8. Total solids: 65 to 75- percent by volume, ASTM-D-2369.

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- B. Water Based primer for raw gypsum board edges
1. Equal to PROSOCO R-Guard GypPrime.
 2. Primer to seal the cut edges of gypsum wall boards where they are exposed in rough openings for windows and doors.
 3. Breatheable liquid primer.
 4. Comply with national, state and district AIM VOC regulations and be 100 g/L or less.
 5. Total solids: 16 percent
- C. Liquid Applied fill coat and seam filler
1. Equal to PROSOCO R-Guard Joint & Seam Filler
 2. High modulus, gun-grade, crack and joint filler, adhesive and detailing compound that combines the best silicone and polyurethane properties. The single-component, Silyl-Terminated-Poly-Ether (STPE) prepares open joints, seams and cracks before installing primary water and air barrier system to prevent the movement of water and air through building envelopes.
 3. Tensile strength: 70 psi when tested in accordance with ASTM D412.
 4. Elongation at break: 180 percent when tested in accordance with ASTM D412.
 5. Peel strength: Greater than 25 pli when tested in accordance with ASTM D1781.
 6. Total solids: 99 percent.
- D. Liquid-applied flashing and detailing membrane
1. Equal to PROSOCO R-Guard Fast Flash.
 2. Gun-grade waterproofing, adhesive and detailing compound that combines the best of silicone and polyurethane properties. The single component, Silyl-Terminated-Poly-Ether (STPE) produces a highly durable, seamless, elastomeric should treat joints, seams, cracks and provide the flashing membrane in rough openings of structural walls and to counter-flash waterproofing and air barrier components.
 3. Referred to on drawings as “Liquid Flashing”.

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- a. At all window and door openings, termination bars, under stainless steel sub flashings, under coated copper weep flashings and as indicated on drawings.
4. AAMA 714-12 Voluntary Specification for Liquid-Applied Flashing Used to Create a Water-Resistive Seal Around Exterior Wall Openings in Buildings.
5. ICC-ES AC 212 Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers Over Exterior Sheathing.
6. Comply with national, state and district AIM VOC regulations and be 30 g/L or less.
7. Water vapor transmission: 21 perms when tested in accordance with ASTM E96.
8. Tensile strength: Greater than 150 psi when tested in accordance with ASTM D412.
9. Elongation at break: Greater than 350 percent when tested in accordance with ASTM D412.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. All surfaces must be sound, clean and free of grease, dirt, excess mortar or other contaminants. Fill or bridge damaged surfaces, voids or gaps larger than one-inch. Fill voids and gaps measuring one-inch or less with liquid applied fill coat and seam filler as necessary to ensure continuity.
 1. Surfaces to receive primary fluid applied air and water barrier must be dry or damp, unless approved by air barrier manufacturer. Surfaces to receive (STPE) fluid applied accessories must be dry, damp or wet to the touch. Brush away any standing water present before application. STPE products will tolerate rain immediately after application.
- B. Refer to manufacturer's product data sheets for requirements for condition of and preparation of substrates.
 1. Surfaces shall be sound and free of voids, spalled areas, loose aggregate and sharp protrusions.
 2. Remove contaminants such as grease, oil and wax from exposed surfaces.
 3. Remove dust, dirt, loose stone and debris.
 4. Use repair materials and methods that are acceptable to the manufacturer of the air and water-resistive barrier system.

5. Refer to manufacturer's product data sheets and manufacturer's installation guidelines for additional information on preparing structural walls to receive the primary air and water resistive barrier.

C. Exterior sheathing:

1. Ensure that the sheathing is properly installed with ends, corners and edges properly fastened. Remove and replace damaged sheathing.
2. Mechanical fasteners used to secure sheathing boards or penetrate sheathing boards shall be set flush with sheathing, and spot overdriven fasteners with liquid applied fill coat and seam filler.
3. Seal the cut edges of gypsum wall boards exposed in rough openings for windows and doors at corners, as recommended by manufacturer.

D. Masonry and concrete substrates:

1. Masonry head and bed joints should be fully filled and tooled.
2. Mechanically remove loose mortar fins, mortar accumulations and protrusions, and debris.
3. Fill cracks, joints and gaps with liquid applied fill coat and seam filler as herein specified.

3.02 FIBER REINFORCED FILL COAT AND SEAM FILLER

- A. General: Comply with the weather and air barrier manufacturer's installation instructions, temperature limitations, product data and shop drawings.
- B. Apply liquid applied fill coat and seam filler for seams, joints, cracks, gaps, primed rough gypsum edges at sheathing, rough openings per manufacturer's written instructions.

3.03 LIQUID APPLIED FLASHING AT WINDOWS, DOORS, OPENINGS AND PENETRATIONS

- A. General: Comply with the weather and air barrier manufacturer's installation instructions, temperature limitations, product data and shop drawings.
- B. Apply liquid flashing membrane over surfaces to seal and waterproof rough openings per manufacturer's written instructions. Spread the wet product to create an opaque, monolithic flashing membrane which surrounds the rough opening and extends 4 to 6 inches over the face of the structural wall. Apply additional coats as needed to achieve void- and pinhole-free surface.

3.04 FLUID-APPLIED AIR & WATER-RESISTIVE BARRIER INSTALLATION

- A. General: Comply with the weather and air barrier manufacturer's installation instructions, temperature limitations, product data and shop drawings.
- B. Apply air and water-resistive barrier to a clean, dry substrate within temperature and weather limitations per manufacturer's written instructions.
 - 1. Apply to recommended thickness.
 - 2. Allow product to cure and dry.
 - 3. Inspect the membrane before covering. Repair any punctures or damaged areas by applying additional material.
 - 4. Back roll as necessary to ensure there are no pinholes, voids or gaps in the membrane. Apply fluid applied air and water-resistive barrier per manufacturer's recommendations.
 - 5. Apply additional coats per manufacturer's written instructions.

3.05 FLUID-APPLIED FLASHING TRANSITIONS

- A. General: Comply with the weather and air barrier manufacturer's installation instructions, temperature limitations, product data and shop drawings.
- B. Apply fiber reinforced fill coat and seam filler and liquid flashing membrane as a liquid flashing membrane to waterproof the transitions in rough opening and between dissimilar materials per manufacturer's written instructions.
 - 1. Fill any voids between the top of the flashing leg and the vertical wall with fiber reinforced fill coat and seam filler.
 - 2. Spread the wet liquid flashing membrane to create a monolithic "cap-flash" flashing membrane per manufacturer's written instructions.
 - 3. Apply additional coats as needed to achieve void pinhole-free surface.
 - 4. Allow treated surfaces to skin before installing other wall assembly, waterproofing or air barrier components.
- C. Apply preformed silicone sealant extrusion to provide a continuous airtight and water-tight seal between material frame and substrate per manufacturer's written instructions.
- D. Embed material in bead of liquid flashing membrane per manufacturer's written instructions.

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END OF SECTION

SECTION 07 41 13
METAL ROOF PANELS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish and install prefinished metal roofing complete with mounting accessories and trim.
- B. Flashings, ridge caps, coping, and metal fascia.
- C. Downspouts and gutters.

1.02 RELATED WORK

- A. Section 06 10 00 – Rough Carpentry
- B. Section 07 42 13 –Metal Wall Panels

1.03 MANUFACTURER’S WARRANTY

- A. Twenty-year coating guarantee.
- B. All material shall have a Kynar 500-based coating system.
- C. All warranties shall be in the name of the Contractual “Owner” as listed in the Owner-Contractor Agreement for this project. The Contractor (General or Sub) shall not be listed as the “Owner” on any warranties.

1.04 INSTALLER WARRANTY

- A. Furnish Owner with a three-year warranty that guarantees that roof repairs and repairs of interior damages that result from roof waterproofing failures are the responsibility of the Contractor.
- B. The roofing warranty period begins when the building is finally accepted by the Owner.
- C. Weathertightness: A manufacturer’s representative shall inspect the installation of the roofing system and, upon approval, furnish a 20-year, no dollar limit (NDL) roofing system warranty for weathertightness. This is to provide up to one full replacement of the roof, including material and labor. The warranty shall include all roofing components consisting of, but not limited to, roof panels, anchoring devices, metal flashing, gutters, roof penetration flashing, roof curbs, plumbing vent flashing, and all other roof items furnished by or approved by the metal roof manufacturer.
- D. All warranties shall be in the name of the Contractual “Owner” as listed in the Owner-Contractor Agreement for this project. The Contractor (General or Sub) shall not be listed as the “Owner” on any warranties.

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1.05 SUBMITTALS

- A. Submit manufacturer's complete color chart.
- B. Submit shop drawings of roof accessory components; include mounting information.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. MBCI.
- B. Englert.
- C. Pac-Clad.
- D. RollCOM.

2.02 PREFORMED METAL ROOFING

- A. Equal to MBCI Lokseam 12", embossed surface, prefinished 24 gauge steel. Panels to run full length, without joints, from ridge to eave.
- B. Finish: Equal to Signature 300, a fluorocarbon Kynar 500-based product. Color as selected from manufacturer's complete color chart.

2.03 FLASHINGS, RIDGE CAPS, DRIP EDGES, COPINGS, AND PARAPET CAPS

- A. Material: Furnished by metal roofing manufacturer, embossed surface, prefinished, 26 gauge, color selected by Architect.

2.04 GUTTERS AND DOWNSPOUTS

- A. Downspouts: 4" x 5" rectangular of 22 gauge smooth prefinished metal in color to match roof. Coordinate with site drainage, cast iron downspouts and ADS site drainage. Furnished by metal roof manufacturer.
- B. Gutters: Box gutters as shown on drawings, smooth 22 gauge prefinished metal in color to match roof. Furnished by metal roof manufacturer.

2.05 ROOF PENETRATIONS/FLASHINGS AT PENETRATIONS

- A. Roof jacks are required at pipe flashings at all roof metal roof penetrations.
- B. Roof jacks shall consist of a molded Ethylene Propylene Diene Monomer (EPDM) bonded to a corrosion-resistant aluminum alloy base ring. The EPDM sleeve shall be compounded with carbon black and other additives to give maximum weatherability and resistance to ozone and ultraviolet light. The sleeve shall be pleated to conform to any roof pitch and to allow movement to compensate for thermal expansion and contraction. The base ring shall be 1 mm. thick, soft corrosion-resistant aluminum alloy (A 1100-0) that bends easily with hand pressure to conform to any panel configuration. The

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aluminum base ring shall contain 8 equally spaced, pre-punched holes of .125" diameter for attachment to roof panels.

- C. Roof jack packages shall be furnished complete with caulking and fasteners for a completely watertight installation.
- D. Minimize the hole diameter at pipe/stack/vent penetrations of metal building roof panels.
- E. Bend roof jack base to fit panel profile and set in a bed of top quality exterior sealant. Utilize type "A" self-tapping screws to affix roof jack to metal roof panels. Do not penetrate ribs.
- F. Roof penetration flashings furnished by metal roof supplier.

PART 3 - EXECUTION

3.01 STORAGE OF METAL PANELS AND ACCESSORIES

- A. Store materials off the ground and protect with a tarpaulin. Allow for free air circulation between the tarpaulin and the ground.
- B. Prolonged storage is not recommended, so if immediate erection is not possible, take extra care to protect the sheets from water marks.

3.02 INSPECTION

- A. Inspect substrate and supporting structure and the conditions under which the metal roofing and accessories are to be installed. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer and the Architect. Initiation of installation work indicates acceptance of substrate and existing conditions.

3.03 HANDLING

- A. Proper handling of all materials is essential. Care should be taken not to bend, twist, scratch, or otherwise damage panels during installation. Traffic on installed materials should be kept to a minimum, and, where practical, protective devices should be used to prevent damage to metal and paint finishes.

3.04 INSTALLATION

- A. Install in strict accordance with manufacturer's instructions.

END OF SECTION

SECTION 07 42 13
METAL WALL PANELS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish and install prefinished metal wall panels complete with mounting accessories and trim.

1.02 RELATED WORK

- A. Section 06 10 00 – Rough Carpentry
- B. Section 07 41 13 – Metal Roof Panels

1.03 MANUFACTURER'S WARRANTY

- A. Twenty-year coating guarantee.
- B. All material shall have a Kynar 500 based coating system.

1.04 INSTALLER WARRANTY

- A. Furnish Owner with a three-year warranty that guarantees that wall panel repairs and repairs of interior damages that result from wall panel waterproofing failures are the responsibility of the Contractor.
- B. The wall panel warranty period begins when the building is finally accepted by the Owner.

1.05 SUBMITTALS

- A. Submit manufacturer's complete color chart.
- B. Submit cut sheets showing proposed wall panels, mounting accessories, and trim.

PART 2 - PRODUCTS

2.01 PREFORMED METAL WALL PANELS

- A. Wall panel equal to MBCI 7.2 Panel, prefinished 22 gauge, 36" coverage
- B. Soffit panel equal to MBCI Artisan I Series L12, prefinished 22 gauge steel, 12" coverage.
- C. Finish: Equal to Signature 300, a fluorocarbon Kynar 500 based product. Color as selected from manufacturer's complete color chart.

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PART 3 - EXECUTION

3.01 STORAGE OF METAL PANELS AND ACCESSORIES

- A. Store materials off the ground and protect with a tarpaulin. Allow for free air circulation between the tarpaulin and the ground.
- B. Prolonged storage is not recommended, so if immediate erection is not possible, take extra care to protect the sheets from water marks.

3.02 INSPECTION

- A. Inspect substrate and supporting structure and the conditions under which the metal wall panels and accessories are to be installed. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer and the Architect. Initiation of installation work indicates acceptance of substrate and existing conditions.

3.03 HANDLING

- A. Proper handling of all materials is essential. Care should be taken not to bend, twist, scratch, or otherwise damage panels during installation.

3.04 INSTALLATION

- A. Install in strict accordance with manufacturer's instructions.

END OF SECTION

SECTION 07 42 15

PREFINISHED METAL COMPOSITE WALL PANELS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes

1. Preformed, prefinished metal wall panels and flashings.
2. Miscellaneous trim, flashing, closures and accessories.
3. Fastening devices.

B. Related Sections

1. Section 05120 – Structural Steel
2. Section 05400 – Cold Formed Metal Framing
3. Section 06100 – Rough Carpentry
4. Section 7210 – Building Insulation
5. Section 07270 – Air/Weather Barrier
6. Section 07290 – Joint Sealant
7. Section 07540 Thermo Plastic Olefin (TPO) membrane roofing
8. Section 09110 – Metal Stud Framing System

1.02 SUBMITTALS

- A. Submit detailed drawings showing layout of panels, anchoring details, joint details, trim, flashing, and accessories. Show details of weatherproofing, terminations, and penetrations of metal work.
- B. Two copies of manufacturer's literature for panel material.
- C. Product Data: Manufacturer's product literature for the panel specified.
- D. Shop Drawings: For exterior wall panel assemblies and accessories. Include plans; elevations; sections and details.
- E. The Architect reserves the right to adjust joint pattern during shop drawing/submittal phase.
- F. Structural Calculations: Submit a comprehensive analysis of design loads, including dead loads, live loads, wind loads and thermal movement.

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- G. Quality Assurance Submittals: Submit the following:
 - 1. Certificates: Product certificates signed by manufacturer certifying materials comply with the specified performance characteristics and criteria, and physical requirements.
- H. Samples for initial selections: Manufacturer's color charts showing the full range of colors available for units with factory-applied color finishes.
- I. Samples for verification: Provide color samples of selected color. Samples shall involve normal color and texture variations, include sample sets showing the full range of variations expected.
- J. Affidavit certifying that the material meets the requirements specified.

1.03 REFERENCES

- A. American Iron & Steel Institute (AISI) Specification for the Design of Cold formed Steel Structural Members.
- B. ASTM A-525 Steel Sheet, Zinc-Coated (Galvanized)
- C. SMACNA - Architectural Sheet Metal Manual.

1.04 ASSEMBLY DESCRIPTION

- A. The wall assembly includes preformed sheet metal panels, related accessories, miscellaneous flashing and attaching devices.

1.05 QUALITY ASSURANCE

- A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where the project is located and who is experienced in providing engineering services of kind indicated.
- B. Manufacturer Qualifications: Minimum of 5 years experience in manufacturing exterior wall panels similar to those specified.
- C. Installer Qualifications: Acceptable to manufacturer.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Upon receipt of panels and other materials, installer shall examine the shipment for damage and completeness.
- B. Panels should be stored in a clean, dry place. One end should be elevated to allow moisture to run off.
- C. Panels with strippable film must not be stored in the open, exposed to the sun.
- D. Stack all materials to prevent damage and to allow for adequate ventilation.

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- E. Store materials in accordance with manufacturer's recommendations.
- F. Handle materials carefully to avoid damage to materials and finishes.

1.07 WARRANTY

- A. Paint finish shall have a twenty year warranty against cracking, peeling and fade (not to exceed 5 N.B.S. units).
- B. Galvalume material shall have a twenty year warranty against failure due to corrosion, rupture or perforation.
- C. Applicator shall furnish warranty covering watertightness of the wall system for the period of two (2) years from the date of substantial completion.

1.08 PERFORMANCE REQUIREMENTS

- A. Structural performance: provide exterior wall cladding assemblies capable of withstanding the effects of load and stresses from dead loads, wind loads, snow loads and normal thermal movement without evidence of permanent defects of assemblies or components. Refer to Structural
 - 1. Dead load: As required by 2006 IBC.
 - 2. Live Load: As required by 2006 IBC.
 - 3. Wind Load: refer to structural.
 - 4. Thermal Movements: Provide assemblies that allow for thermal movements resulting from the changes in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components and other detrimental effects:
- B. Sealed joints shall allow free and silent movement of panels during expansion and contraction while preventing uncontrolled penetration of moisture.
- C. Manufacturing, installation, and sealing shall prevent deformation of exposed surfaces.
- D. Design panel system to accommodate substructure tolerance of +0 to -1/8 inch.
- E. Design the system to affect a positive mechanically fastened assembly to substructure, not dependent on adhesives.
- F. Not Permitted: Vibration harmonics; wind whistles; noises caused by thermal movement; thermal movement transmitted to other building elements; loosening, weakening or fracturing of attachments or components of system.
- G. Structural Performance / Uniform Load Deflection Test: Provide panel system that has been tested in accordance with ASTM E330 at a design pressure of 60 psf without deformation or failures of structural members. Maximum allowable deflection of span: L/60.

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- H. Air Infiltration: Panel system shall not have air infiltration rate more than 0.06 cfm per sq. ft. of fixed wall area when tested in accordance with ASTM E283 at static air pressure differential of 1.57 psf.
- I. Static Water Penetration: Panel system shall have no water penetration as defined by in test method when tested in accordance with ASTM E331 at inward static pressure differential of not less than 6.24 psf and not more than 12.0 psf.
- J. Dynamic Water Penetration: Panel system shall have been tested in accordance with AAMA 501 and shall have passed with no uncontrolled water leakage at 10.00 psf dynamic pressure differential, with water application rate of 5 gallons/hr/sqft.

1.09 PROJECT CONDITIONS

- A. Field Measurements: Verify actual supporting and adjoining construction by field measurements before fabrication, and indicate recorded measurements on final shop drawings. Coordinate construction to ensure that wall panel assemblies fit properly to supporting and adjoining construction and coordinate schedule with construction progress to avoid delaying the work.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Firestone Metal Products or equal.
 - 1. Bases of design: Series 1000 - Aluminum Composite Wall Panel System with UNA-CLIP

2.02 MATERIALS

- A. Panels shall be pre-finish 4mm PE core, aluminum composite material.
- B. Composite panels shall have a Class “A” building material rating when tested in accordance with ASTM E84 (Steiner Tunnel Test) and shall exhibit a flame spread of 15 and a smoke developed rating of 120, with a center panel joint.
- C. Panels shall have passed the ASTM E108 modified test.

2.03 FABRICATION

- A. Composition
 - 1. Aluminum composite material shall be composed of a thermoplastic core sandwiched between two aluminum sheets formed in a continuous process with no applied glues or adhesives.
 - 2. Bond integrity per ASTM D1781-76 and ASTM C481 Cycle B, shall be a minimum of 40 in-lb.in. (Peel Strength)
- B. Aluminum face sheets

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1. Thickness .020" of 3105 H25 aluminum alloy

C. Tolerances

1. Panel bow shall not exceed 3.8% of panel overall dimension in width or length.
2. Panel dimensions shall be such that there will be an allowance for field adjustment and thermal movement.
3. Panel lines, breaks and curves shall be sharp, smooth and free from warps or buckles.

D. Panel surfaces shall be free of scratches or marks caused during fabrication.

E. Ensure that entire project is manufactured from single color, coil paint run to ensure color uniformity

F. Hem all exposed edges of flashing on underside, 1/2 inch.

G. The Architect reserves the right to adjust joint pattern during shop drawing/submittal phase.

2.04 ACCESSORIES

A. Panel attachment clips: provide clips at pre-engineered installation locations. Clip to field hook and snap in to pre-punched slot in panel return flange. Clip to be fabricated from extruded aluminum material – panel clips to ship loose for field installation.

B. Fasteners: As recommended by the panel manufacturer.

C. All hidden fasteners shall be Climaseal coated or stainless steel.

D. Flashing: Aluminum, same finish as for aluminum panel where exposed; secured with concealed fastening method.

E. Panel System Subgrits: Provide G90 galvanized steel of gauge and spacing required for panel system structural requirements, as recommended by panel manufacture and in accordance with approved shop drawings. To avoid galvanic reaction, separate dissimilar metals.

2.05 FINISHES

A. Comply with NAAMM's Metal Finishes Manual for architectural metal products recommendations for applying and designating finishes

2.06 ALUMINUM FINISHES

A. Panel Finishes:

1. Coating shall be Spray-Applied Fluorocarbon Resin utilizing 70% Kynar 500 resins. Color as selected by Architect from manufacturer's standard colors.

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2. Number of Coats: 2-coat, 3-coat, or 4-coat. Coating shall be factory applied on a continuous process paint line. Coating shall consist of a 0.2 mil prime coat, a 0.75 mil barrier coat, a 0.75 mil metallic/color coat containing 70% Kynar resins, and a 0.5 mil clear coat containing 70% Kynar resins (Note mil thickness is approximate.)
 3. Relevant to the color selected, material to be painted in accordance with either AAMA specification 2605 or 2604.
 4. Provide factory applied strippable plastic film for protection during fabrication and installation. This strippable film MUST be removed immediately before installation.
- B. Field protection must be provided by the contractor at the job site so stacked or coiled material is not exposed to weather and moisture.
- C. Flashing maybe factory fabricated or field fabricated. Unless otherwise specified all exposed adjacent flashing shall be of the same material and finish as panel system.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Coordinate setting, drawings, diagrams, templates, instructions, and directions for installation. Panel substructure shall be level and plumb. Panel substructure shall be structurally sound as determined by that subcontractor's engineer. Panel substructure shall be free of defects detrimental to work and erected in accordance with established building tolerances. Coordinate delivery of such items to project site.

3.02 INSTALLATION

- A. Erect panels level and plumb, in proper alignment in relation to substructure framing and established lines.
- B. Panels shall be erected in accordance with shop drawings.
- C. Panel anchorage shall be structurally sound and per engineering recommendations.
- D. Where aluminum materials come in contact with dissimilar materials, an isolation shim or tape shall be installed at fastening locations.
- E. Locate and place wall panels' level, plumb, and at indicated alignment with adjacent work.
- F. Comply with manufacturers standard instructions and conform to standards set forth in the Architectural Sheet Metal Manual published by SMACNA, in order to achieve a watertight installation
- G. Remove protective strippable film prior to installation of panels.

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- H. Attach panels using manufacturer's standard clips and fasteners, spaced in accordance with shop drawings.
- I. Do not allow panels or trim to come into contact with dissimilar materials.
- J. Remove and replace any panels or components which are damaged beyond successful repair.

3.03 CLEANING AND PROTECTING

- A. Clean exposed surfaces of wall panels that are not protected by temporary covering to remove fingerprints and soil during construction period.
- B. Clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Protect wall panels from damage during construction. Use temporary protective coverings where needed as approved by the wall panel manufacturer.
- D. Clean and touch up minor abrasions in finish with air-dried coating that matches color and gloss, and is compatible with, factory-applied finish coating.
- E. Clean any grease, finger marks or stains from the panels per manufacturer's recommendations.
- F. Remove all scrap and construction debris from the site.

END OF SECTION

SECTION 07 72 00
ROOF ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Furnish and install new flashing.
2. Furnish and install new gutters, downspouts, flashing, and brackets (straps).
3. Install new fascia drip edge.
4. Install new neoprene flashing at vent stacks.

B. Related Sections

1. Section 06 10 00 – Rough Carpentry
2. Section 07 41 13 – Metal Roof Panels
3. Section 13 34 19 – Metal Building Systems

1.02 SUBMITTALS

- A. Submit a digital copy of product data which includes detailed specifications and applicable field measurements.

PART 2 - PRODUCTS

2.01 PREFINISHED METAL

- A. Equal to MBCI or Colorklad 26 gauge prefinished metal. Color as selected by Architect and/or Owner.

2.02 GUTTERS

- A. Box gutters as shown on Drawings, smooth 26 gauge prefinished metal.

2.03 DOWNSPOUTS

- A. 4" x 5" rectangular prefinished metal downspouts, 26 gauge prefinished metal.
- B. Downspout straps, 26 gauge prefinished metal. Strap quantity as per manufacturer's recommendations.

2.04 DRIP EDGES/FLASHING

- A. 26 gauge prefinished metal drip edges and flashing in configurations as required.

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2.05 PIPE FLASHING

- A. Neoprene: equal to Deck Mate.

2.06 FASTENERS

- A. Copper or galvanized nails and/or screws.
- B. Expansion anchors at all masonry connections.

PART 3 - EXECUTION

3.01 GUTTERS

- A. Slope to provide positive drainage to downspouts.
- B. Install with spikes or straps at 4'-0" o.c.

3.02 DOWNSPOUTS

- A. Basket strainers required at downspouts.
- B. Concealed anchorage of gutters and downspouts required.
- C. Exception: Decorative downspout straps.
- D. Minimize the number of joints in downspouts.
- E. Solder all joinery to provide a watertight installation.
- F. Connect downspouts to subsurface drainage systems when present.

3.03 FLASHINGS/DRIP EDGES

- A. Minimize number of joints.
- B. Saw cut masonry for installation of wall flashing. Install flashing in step configuration.
- C. Seal all exposed joints with flashing cement (sealant) or solder where applicable
- D. Used concealed fasteners where practical.

END OF SECTION

SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.01 SUMMARY

A. WORK INCLUDED

1. Clean and prepare joint surfaces.
2. At building exterior, install backing materials and sealant around louvers, vents, and door and window frames.
3. Install caulking at junction of gypsum board and dissimilar materials.
4. At control and expansion joints, install backer rod and sealant.
5. Sealant at junction of plumbing fixtures and adjacent materials.

B. Related Sections

1. Section 04 21 13 – Brick Masonry
2. Section 04 22 00 – Concrete Unit Masonry
3. Section 08 11 13 – Hollow Metal Doors and Frames
4. Section 08 41 00 – Aluminum Framed Entrances and Storefronts
5. Section 08 51 13 – Aluminum Windows
6. Section 09 29 02 – Exterior Gypsum Board Sheathing
7. Section 09 91 00 – Painting
8. Division 22 – Plumbing
9. Division 23 – HVAC
10. Division 26 – Electrical
11. Division 27 – Communications
12. Division 28 – Electronic Safety and Security

1.02 WARRANTY

- A. Provide a one-year warranty for exterior sealants.
- B. Warranty: Replace sealants which fail because of loss of cohesion or adhesion or which do not cure.

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1.03 SUBMITTALS

- A. Submit a digital copy of detailed product data on each sealant. Product data is to include installation instructions, including joint preparation and back-up rod recommendations for specific sealant.

PART 2 - PRODUCTS

2.01 SEALANT MATERIALS

- A. Back-Up Rod: Filler backing shall be polyethylene foam or polyurethane foam, rods or stops as required.
- B. Primers: As recommended by sealant manufacturer.
- C. Sealant for use around exterior window and door frames, vertical expansion joint/control joints equal to Tremco Dymonic 100 or Vulkem 116:
 - 1. Color to match adjacent materials. Submit samples for Architect's approval.
- D. Caulking: Acrylic latex to match color of adjacent materials. Caulking shall be paintable and equal to Tremco remflex 834.
- E. **The use of silicone for joints sealants is prohibited.**
- F. Sealant at plumbing fixtures: Silicone to match color of fixtures.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that joint dimensions and physical and environmental conditions are acceptable to receive work of this Section.
- B. Beginning of installation means acceptance.

3.02 PREPARATION

- A. Clean, prepare, and size joints in accordance with manufacturer's instructions. Remove any loose materials and other foreign matter which might impair adhesion of sealant.
- B. Verify that joint shaping materials and release tapes are compatible with sealant.
- C. Examine joint dimensions and size materials to achieve required width/depth ratios.
- D. Use joint filler to achieve required joint depths, to allow sealants to perform properly.

3.03 INSTALLATION

- A. Perform work in accordance with ASTM C804 for solvent release sealants.
- B. Install sealant in accordance with manufacturer's instructions.

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- C. Apply sealant within recommended temperature ranges. Consult manufacturer when sealant cannot be applied within recommended temperature ranges.
- D. Tool joints concave.
- E. Joints more than $\frac{3}{4}$ " deep and joints where a suitable backstop has not been provided shall be packed with rope to within $\frac{1}{2}$ " of surface before applying caulking.

END OF SECTION

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Hollow metal doors (rated & non-rated), and glass
- B. Hollow metal frames (rated & non-rated), and glass
- C. Coordination of frames for gypsum board and/or masonry walls

1.02 RELATED WORK

- A. Section 04 05 13 – Masonry Mortaring
- B. Section 04 21 13 – Brick Masonry
- C. Section 04 22 00 – Concrete Masonry Units
- D. Section 08 14 16 – Flush Wood Doors
- E. Section 08 14 33 – Stile and Rail Wood Doors
- F. Section 08 71 00 – Door Hardware
- G. Section 09 91 00 – Paint: Field painting of hollow metal doors and frames.

1.03 QUALITY ASSURANCE

- A. Conform to requirements of Underwriters Laboratory for Fire rated doors and frames. See Schedule.

1.04 SUBMITTALS

- A. Submit a digital copy of shop drawings and product data to Architect.
- B. Indicate door elevations, internal reinforcement, closure method.

1.05 COORDINATION

- A. Field verify all opening dimensions and installation conditions prior to ordering steel doors and frames.
- B. Coordinate door/frame preparation with approved finish hardware schedule, wall types, door types, and alternates.

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PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Curries or approved equal.

2.02 HOLLOW METAL DOORS

- A. Fabricate doors from 16 gauge galvanized steel. Tops and bottoms of all doors to be closed flush, filled and ground smooth. Exterior doors shall be galvanized.
- B. Exterior doors shall be insulated with rigid foam.
- C. Doors and frames shall receive hardware reinforcing at hinges, strikes and for any surface applied items.
- D. Vertical stiffeners of doors shall be welded to the inner side of the surface sheets at 6 inches cc.
- E. Channel stiffeners required at top and bottom of doors to insure rigidity. Voids between stiffeners to be insulated for sound deadening.
- F. All doors shall be thoroughly cleaned of shop oils after fabrication, treated for paint adherence and painted one coat of high grade zinc chromate primer, which shall be oven dried.
- G. Full louver exterior doors shall be furnished with insect screen.
- H. All glass in hollow metal doors shall be fire and impact rated
 - 1. Refer to Section 08 81 00 – Glass Glazing

2.03 HOLLOW METAL FRAMES

- A. Interior Frames: 16 gauge cold-rolled steel
- B. Exterior Frames: 14 gauge cold-rolled steel, galvanized.
- C. All frames shall be welded.
- D. Furnish with pressure-applied rubber silencers.
- E. All frames shall have 9 gauge steel hinge reinforcement plates and 14 gauge strike reinforcement plates.
- F. Furnish a minimum of six anchors per opening. All frames shall have integral or welded-on sill anchor. Anchors at drywall partitions shall be "z"-clips welded to frames. Tee anchorage devices at masonry walls.
- G. All frames shall be thoroughly cleaned, phosphatized and finished as standard with one coat of baked-on rust inhibiting gray prime coat.

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H. All glass in hollow metal doors shall be fire and impact rated

1. Refer to Section 08 81 00 – Glass Glazing

PART 3 - EXECUTION

3.01 STORAGE

A. Stack and store doors properly to protect material from harmful elements and damage while stored at the job site.

B. Upon delivery, touch-up damaged areas of finish with a rust-inhibitive metal primer.

3.02 INSTALLATION

A. Hang doors plumb and true, with uniform clearances on all sides.

3.03 ADJUSTMENT AND CLEANING

A. Remove dirt and excess sealants from exposed surfaces.

B. Touch up marred or abraded surface to match original finish.

C. Adjust doors for smooth and balanced door movement.

END OF SECTION

SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Solid core, flush wood doors.
 - 2. Fire-rated, solid core, flush wood doors.
- B. Related Sections
 - 1. Section 06 10 00 – Rough Carpentry
 - 2. Section 06 20 00 – Finish Carpentry
 - 3. Section 08 11 13 – Hollow Metal Doors and Frames
 - 4. Section 08 71 00 – Door Hardware
 - 5. Section 08 81 00 – Glass Glazing
 - 6. Section 09 91 00 – Painting

1.02 REFERENCES

- A. WDMA – Window and Door Manufacturers Association: IS 1-A 1997 Industry Standard for Architectural Flush Wood Doors.
- B. NFPA-80 Standards for Fire Doors, latest edition.
- C. NFPA-105 Recommended Practice for Installation for Smoke-Control Door Assemblies, latest edition.
- D. AWI – Quality Standards of Architectural Woodwork Institute.

1.03 SUBMITTALS

- A. Shop Drawings and Product Data:
 - 1. Indicate door elevations, general construction, stile and rail enforcement, core composition jointing methods, hardware and louver locations, internal blocking for hardware attachment, and locations of cutouts for glass. Indicate thickness of veneers.
- B. Samples:

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1. Submit samples of wood veneer and factory finishing in accordance with WDMA Quality Standards I.S. 1-A, latest edition.

C. Certification:

1. Submit certification that doors and frames comply with specified fire ratings, and UL listings.

1.04 QUALITY ASSURANCE

- A. Provide wood doors which are identical in materials and construction to units tested in door and frame assemblies with local code standards, and which are labeled and listed for ratings indicated by ITS – Warnock Hersey, UL, or other testing and inspection agency acceptable to authorities having jurisdiction.
- B. WDMA: Window and Door Manufacturers Association Quality Standards for grade of door, core, construction, finish, and other requirements.
- C. Temperature Rise Rating: At stairwell enclosures, provide doors that have Temperature Rise Rating of 250 degrees F maximum in 30 minutes of fire exposure.

1.05 DELIVERY, STORAGE AND PROTECTION

- A. Protect doors during transit, storage, and handling to prevent damage, soiling, moisture damage, or deterioration. Store doors flat on a level surface in a dry, well ventilated building.
- B. Doors should not be subject to abnormal heat, extreme dryness, or relative humidity less than 30 percent or more than 60 percent.

1.06 WARRANTY

- A. Wood doors shall be warranted for one year from the date of substantial completion.

1.07 COORDINATION

- A. Take special care to coordinate door preparation with requirements of approved finish hardware schedule.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Marshfield
- B. Graham Manufacturing
- C. Eggers Industries
- D. Algoma Hardwoods

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2.02 MATERIALS

- A. AWI Premium Grade, book matched veneers.
- B. Five-ply construction using three-ply hardwood faces.
- C. Thickness: 1-3/4 Inch.
- D. Stiles: 1½” hardwood to match face veneer over structural composite lumber glued to core.
- E. Rails: Mill option hardwood or structural composite lumber. Top and bottom: 2 inches before trim or factory fit.
- F. Facing: Wood veneer cut and species as specified shall conform to WDMA
- G. Hardware: Pre-routed for butts, machined for lockset. Coordinate with requirements for approved finish hardware schedule.
- H. Wood Veneer
 - 1. Door face veneers shall meet quality standards conforming to WDMA “A” grade or “AA” grade for transparent or semi-transparent finish. Minimum face veneer thickness: 1/50" at 12% moisture content after finish sanding.
 - 2. Species: Natural Birch.
 - 3. Cut and assembly: Rotary cut, book match.
- I. Adhesives
 - 1. Face to core adhesives shall be Type I or Type II as appropriate for location in building. Adhesives must be classified Type I or Type II per WDMA specification for “Adhesive Bond Test Method.” Type I adhesives shall be used for doors in exterior applications. Type II adhesives shall be used for doors in interior applications.
- J. Core
 - 1. Non-rated and 20 minute doors: Solid particleboard.
 - 2. Fire-rated doors: Non-combustible mineral core containing no asbestos.

2.03 ACCESSORIES

- A. Vision Panels shall be metal beveled frames with fire and impact glass as required. Refer to Section 08 81 00 – Glass Glazing.
- B. Provide and install louvers, as scheduled. Louvers shall be metal, sight-proof, V-slat.

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2.04 FABRICATION

- A. Fabricate wood doors in accordance with requirements of WDMA, Quality Standards.
- B. Fabricate fire rated doors in accordance with requirements of ITS – Warnock Hersey, or Underwriters’ Laboratories, with metal label on each door.
- C. Provide doors with minimum ¼ inch thick edge strips, of wood species to match face veneers except as required for fire rating.
- D. Make cutouts and provide stops for glass and louvers. Install metal door louvers. Seal cutouts prior to installation of moldings.
 - 1. For full light doors, provide cut out from flush wood door, with vertical grain direction.
- E. Bevel lock and hinge edges of single acting doors 3 degrees or 1/8 inch in 2 inches. Radius strike edge of double acting swinging doors as required by hinge manufacturer.
- F. Prepare doors to receive hardware. Refer to Section 08 71 00 – Door Hardware.
 - 1. Pre-fit and bevel to net opening size less approximately ¼ inch in width on single swing doors 3/16 inch in width for paired doors. Provide ¼ inch clearance above finished floor, unless otherwise indicated on drawings. Provide 1/8 inch clearance at top of door.
 - 2. Slightly ease vertical edges.
 - 3. Machine cut relief for hinges and machining for handsets. Coordinate with requirements of Sections 08 11 13 and 08 71 00.
- G. On fire rated pairs of doors greater than 20 minutes, supply overlapping astragals or metal edge sets only as required by NFPA or by door manufacturer’s fire door authorities. If an astragal is required, to comply with fire rated labeling requirements for pairs of doors, provide door manufacturer’s standard tested astragal.

2.05 FINISH:

- A. Follow WDMA, “Care and Handling at Job Site,” instructions for field applied finishes.

2.06 FACTORY FINISHING

- A. Comply with referenced WDMA specification for “Factory Finishing” for Premium Grade factory finish systems.
- B. Pre-finish wood doors at factory.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine installed door frames before hanging doors.

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- B. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Handle doors in accordance with recommendation of WDMA, "Care and Installation at Job Site."
- B. Condition doors to average temperature and humidity in area of installation for not less than 48 hours prior to installation. Store doors per recommendation of WDMA, "Care and Installation at Job Site."
- C. Install doors in a neat and workmanlike manner, free from hammer or tool marks, open joints or slivers.
- D. Install doors in accordance with manufacturer's instructions.
- E. Set doors plumb, level, square, and true. Install work after building humidity is at acceptable level.
- F. Remove and replace all doors that are warped, twisted, bowed, or otherwise damaged. Do not install doors that cannot be properly fitted to frames.
- G. Adjust doors and hardware and other moving or operating parts to function smoothly and correctly.
- H. Ensure that smoke gaskets are in place before the installation of doors.
- I. Prepare doors to receive finish hardware in accordance with AWI requirements. Coordinate door preparation with requirements of finish hardware schedule.
- J. Conform to AWI requirements for fit tolerances.
 - 1. Maximum Diagonal Distortion: 1/8 inch measured with straight edge, corner to corner.

3.03 ADJUSTING AND CLEANING

- A. Adjust for smooth and balanced door movement.
- B. Clean all doors, glass, and hardware. Remove all markings.
- C. Refinish or replace doors damaged during installation.

END OF SECTION

SECTION 08 33 13
COILING COUNTER DOORS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Coiling counter shutters.

1.02 FURNISH AND INSTALL

- A. All rolling steel counter shutters including accessories as shown on the Drawings and herein specified.

1.03 WARRANTY

- A. Rolling counter shutter and its components shall be free from defects in material and workmanship for a period of one year from the date of project acceptance.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Equal to Raynor.

2.02 CURTAIN

- A. Series "CA."
- B. Lateral movement of the slats shall be contained by the notching of the ends of the slats.

2.03 SLATS

- A. Series "CA."
- B. The curtain shall consist of interlocking flat-faced extruded aluminum (6063T5) slats not less than .05" (1.33MM) thick. The bottom of the curtain to be extruded aluminum (6063T5) with a rubber vinyl astragal for sill protection.

2.04 GUIDES

- A. Series "CA."
- B. Guides shall be extruded aluminum (6063T5) with wool pile inserts on both sides. (N10 push-up type face mounted.)

2.05 BRACKETS

- A. Bracket plates for mounting curtain and barrel assembly shall be a minimum of 10 gauge, hot dipped and galvanized steel.

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2.06 BARREL

- A. The barrel shall be made from a minimum of 4-1/2" (114.3 MM) O.D. x .120 inches (3.1 MM) wall structural steel pipe.

2.07 COUNTERBALANCE

- A. The curtain shall be counterbalanced by means of oil tempered, helical torsion springs, grease-packed and mounted on a single continuous steel torsion shaft.
- B. Springs shall be compression spring design to facilitate any counterbalance maintenance.

2.08 HOOD

- A. Series "CA."
- B. Hood shall be rectangular type formed from .04" (1.00 MM) aluminum.

2.09 OPERATION

- A. Manual operation to be provided with slide bolt lock.

2.10 FINISH

- A. Series "CA" aluminum – Curtain, guides, and hood shall be clear anodized 204-R1 finish.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Rolling counter shutters shall be installed by an authorized distributor.

END OF SECTION

SECTION 08 41 00

ALUMINUM FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. New aluminum storefront entrances and doors, clear anodized finish.
- B. New aluminum framing, clear anodized finish.
- C. Removable center mullions at designated doors.

1.02 RELATED WORK

- A. Section 07 92 00 – Joint Sealant
- B. Section 08 71 00 – Door Hardware
- C. Section 08 81 00 – Glass Glazing

1.03 WARRANTY

- A. Provide five-year manufacturer's warranty on glazing, one-year warranty on parts, material, and installation. Warranty shall include coverage of sealed glass units from seal failure, interpane dusting or misting, and replacement of same.

1.04 SUBMITTALS

- A. Shop Drawings:
 - 1. Showing construction of all parts, metal thicknesses, and installation and erection details including connections, anchorage, and fastening and sealing methods.
 - 2. Sections of typical members, dimensioned elevations, frame sizes, spacing of anchors and fasteners, and details of accessories.
 - 3. The Contractor is responsible for all field-dimension coordination.
 - 4. Coordinate preparation of frames with approved finish hardware schedule.

PART 2 - PRODUCTS

2.01 ACCEPTABLE PRODUCTS

- A. Kawneer 451 and 451T.
- B. Similar products by Vistawall and EFCO will be considered equal.

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2.02 ALUMINUM STOREFRONT ENTRANCES

- A. Doors shall be wide stile, equal to Kawneer No. 500 Heavywall.
- B. Finish: Clear anodized.
- C. Sidelight and transom framing: Equal to Kawneer Conte flush glaze, No. 451-T.
- D. Aluminum storefront hardware:
 - 1. Hinges: Continuous geared hinges.
 - 2. Exit devices: Equal to Von Duprin, 33/35 Series. Cylinder dogging required.
 - 3. Push/pull devices: Architectural stainless steel (CO-9).
 - 4. Closers: Equal to LCN-4040, surface-mounted, ADA-compliant.
 - 5. Thresholds and weather-stripping required.
 - 6. All hardware except continuous hinges shall be through-bolted.
- E. Removable mullion required at all pairs of doors. Mullion to be provided with keyed release.

2.03 ALUMINUM FRAMING

- A. 2" x 4-1/2" thermally broken at exterior.
 - 1. Door jambs and heads are not required to be thermally broken.
- B. 2" x 4-1/2" standard at interior.
- C. Head/jamb receptor and sub-sill required at masonry installations.
- D. Glazing: As scheduled.
- E. Finish: Clear anodized.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Assure that window openings conform to dimensions and tolerances shown on plans. All dimensions shall be field-verified prior to fabrication.
- B. Check that surfaces to contact windows are free of debris.
- C. Do not proceed with installation until unsatisfactory conditions are corrected.

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3.02 ASSEMBLY

- A. Window wall frames shall be accurately joined at corners with unexposed screws in extruded splines, which are an integral part of all horizontal members. All joints shall be sufficiently caulked to achieve a watertight seal.
- B. Where aluminum comes in contact with masonry, concrete, mortar, plaster, or dissimilar material, apply heavy coat of bituminous paint.

3.03 ERECTION

- A. All openings shall be prepared plumb and square by others and the window wall frames shall be of sufficient size to provide the required clearances at head, jambs and sill. Installation and glazing shall be performed by experienced technicians. All units shall be securely anchored and ready for operation. Sub-sill is to be set in two heavy beads of sealant and an interior bead between sub-sill back-let and sill or floor. Sub-sill ends shall be filled with sealant to insure no water penetration to corners.
- B. Furnish and apply sealant that is compatible with window systems to provide a completely watertight installation at all joints. Wipe off excess sealant and leave exposed surfaces and joints clean, uniform, and smooth.

3.04 CLEANING

- A. Final cleaning of window frames and glass shall be performed by the General Contractor.

END OF SECTION

SECTION 08 51 13
ALUMINUM WINDOWS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Material: Aluminum windows as on the drawings and specified in this section.
- B. Installation: Labor, tools, and material need to install aluminum windows
- C. Glass and glazing.

1.02 RELATED WORK

- A. Section 07 92 00 – Joint Sealant

1.03 REFERENCES

- A. AAMA – American Architectural Manufacturers Association
 - 1. AAMA/NWWDA 101/I.S.2 – 97 “Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors”
 - 2. AAMA 502-90 “Voluntary Specification for Field Testing of Windows and Sliding Glass Doors”
 - 3. AAMA 603.8.92 “Voluntary Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum”
 - 4. AAMA 605.2-92 “Voluntary Specification for High Performance Organic Coatings on Architectural Aluminum Extrusions and Panels”
 - 5. AAMA 607.1-77 “Voluntary Guide Specification and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum”
 - 6. AAMA 608.1-77 “Voluntary Guide Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum:
 - 7. AAMA 701-92 “Voluntary Specification for Pile Weatherstripping”
 - 8. AAMA 800-92 “Voluntary Specifications and Test Methods for Sealants”
 - 9. AAMA 902-94 “Voluntary Specification for Sash Balances”
 - 10. AAMA 910-93 “Voluntary ‘Life Cycle’ Specifications and Test Methods for Architectural Grade Windows and Sliding Glass Doors”
 - 11. AAMA 1503.1-88 “Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections”

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12. AAMA CW-10-82 "Care and Handling of Architectural Aluminum from Shop to Site"

B. ASCA – Architectural Spray Coaters Association

1. ASCA 96 "Voluntary Specification for Superior Performance of Organic Coatings on Architectural Aluminum Curtainwall, Extrusions, and Miscellaneous Aluminum Components"

C. ASTM – American Society for Testing and Materials

1. ASTM E 90-90 "Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions"
2. ASTM E 283-91 "Standard Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors"
3. ASTM E 330-90 "Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference"
4. ASTM 331-93 "Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference"
5. ASTM E 547-93 "Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential"
6. ASTM E 774-92 "Specification for Sealed Insulating Glass Units"

1.04 SYSTEM DESCRIPTION

- A. AAMA Designation: H-AW45.
- B. Windows: 4" frame depth; extruded aluminum with integral structural polyurethane thermal break in the frame and sash members; equal-leg frame; finish factory-applied; frames and sash factory-assembled.
- C. Configuration: Single hung; all operating sash tilt in for glass cleaning.
- D. Glazing: 1" insulating glass; black reuseable flexible PVC channel gasket with weep holes; glass description in paragraph 2.04; factory-glazed.

1.05 PERFORMANCE REQUIREMENTS

- A. Conformance to H-AW45 specifications in AAMA/NWWDA 101/I.S.2-97 when tests are performed on the prescribed 5'-0" x 8'-0" minimum test size with the following test results:
 1. Air Infiltration: After the AAMA 910-93 life cycle test, maximum .30 cfm/square foot when tested per ASTM E 283-91 at a static air pressure difference of 6.24 psf.

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2. Water Penetration: After the AAMA 910-93 life cycle test, no uncontrolled water leakage when tested per ASTM E 331-86 at a static air pressure difference of 9.75 psf.
 3. Uniform Deflection: No more than L/175 when tested per ASTM E 330-90 at a static air pressure difference of 45 psf.
 4. Uniform Structural: Window to be operable, and maximum .2% permanent deformation per member when tested per ASTM E 330-90 at a static air pressure difference of 67.5 psf.
- B. Thermal testing per AAMA 1502.6-77, at the 5'-6" x 7'-9" test size glazed with 1" insulating glass made with 1/8" clear lites, with the following test results:
1. Condensation Resistance Factor: Minimum 47 CRF.
 2. Thermal Transmittance: Maximum .64 BTU/HR/SQ.FT/F U value.

1.06 SUBMITTALS

- A. Shop Drawings: Window location chart; typical window elevations; details of assemblies, hardware, and glazing details for factory-glazed units.
- B. Product Data: Manufacturer's specifications and test reports from an AAMA-accredited laboratory
- C. Samples: Each specified finish for aluminum; other samples as requested.

1.07 QUALITY ASSURANCE

- A. Field verify all opening dimensions and installation conditions prior to ordering aluminum windows.
- B. Furnish a valid AAMA "Notice to Product Certification" indicating that the windows for the project conform to AAMA/NWDA 101/I.S.2-97.
- C. Furnish visible, permanent IGCC certification labels for the CBA rating level on dual-seal double insulating glass units.
- D. Contractor's warranty:
 1. Warrant for one (1) year against water intrusion into the building interior.
- E. Manufacturer's Warranties
 1. Windows: Warrant for one (1) year against defects in material or workmanship under normal use.
 2. Dual-seal insulating glass units: Warrant for five (5) years against visual obstruction from film formation or moisture collection between internal glass surfaces, excluding that caused by glass breakage or abuse.

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1.08 DELIVERY, STORAGE, AND HANDLING

- A. Handle and protect windows and accessories in accordance with AAMA CW-10-82 until project completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. TRACO TR-9000 Single Hung Tilt Thermal Aluminum Window.
- B. Kawneer 836T Single Hung Tilt Thermal Aluminum Window.
- C. Graham 3400 Single Hung Tile Thermal Aluminum Window.

2.02 MATERIALS

- A. Aluminum Extrusions: Produced from commercial quality 6063-T5 alloy; free from defects impairing strength and durability.
- B. Hardware: White bronze pole-operated cam meeting rail lock and keeper – one (1) set per window under 48" wide, two (2) sets on wider windows; zinc sash pivot bars; tilt latches, operated with a 3/16" hex key, spring-loaded for automatic jamb engagement when the sash is in the vertical position.
- C. Weatherstripping: Secured in extruded ports; double rows on sash perimeters; one EPDM bulb seal in bottom sash lift rail in contact with exterior frame sill, and pile conforming to AAMA 701-92 with polypropylene center fin in remaining locations.
- D. Balances: Heavy duty spring Class 5; conforming to AAMA 902-94, of same design as used in the AW "Life Cycle" test, and of appropriate capacity to hold each sash stationary and permit smooth operation; nylon balance shoes which lock in the tilted position to prevent sash travel and resist sash removal with pivot bar snap locks.
- E. Insect Screens: Half; held in exterior integral tracks with top pivots and sill automatic latches; 7/16" x 1 1/4" x .045" extruded tubular aluminum frame with window finish; corners mitered, gusset reinforced, and crimped; 18 x 16 dark fiberglass mesh secured to frame with PVC spline.

2.03 FABRICATION

- A. Frame: Head and sill coped and fastened to jambs with three (3) stainless steel screws per frame corner; corners factory-sealed conforming to AAMA 800-92.
- B. Sash: Tubular horizontal sash rails coped and fastened to vertical sash stiles with a telescope-design joint secured with one (1) stainless steel screw per sash corner; corners factory-sealed with sealant conforming to AAMA 800-92.
- C. Sash Design: Continuous extruded pull-down rail on top sash exterior and lift rail on bottom sash interior; mechanical meeting rail interlock; weep holes for drainage.

2.04 DUAL GLAZED GLASS UNITS

- A. Construction
 - 1. Dual perimeter sealants: Polyisobutylene and silicone.
 - 2. Air Space: Continuous aluminum; no corner keys; desiccant.
- B. Exterior glass lite
 - 1. Thickness: 1/8".
 - 2. Tint: Gray.
 - 3. Type: Tempered.
- C. Interior glass lite
 - 1. Thickness: 1/8".
 - 2. Tint: Clear.
 - 3. Type: Tempered.
- D. Performance
 - 1. Seal Durability: Conformance to ASTM E 774-92; visible, permanent IGCC certification label for CBA rating level.

2.05 FINISH ON ALUMINUM EXTRUSIONS

- A. Application: On clean extrusions free from serious surface blemishes; on exposed surfaces visible when installed product's operating sash is closed.
- B. Coating: Clear anodize.
- C. Quality Standard: Conforming to AAMA 607.1-77.
- D. Thickness: AAM10C22A41 Class I .7 mils #215.

2.06 INSTALLATION ACCESSORIES

- A. Material: Extruded aluminum; nominal .062" wall; with exposed surfaces finished to match window color and finish performance; concealed fasteners; required weatherseals; designed for unrestricted expansion and contraction.,
- B. Exterior: Two-piece head and jamb receptor with thermal break; subsill with thermal break and end dams.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Prepare openings to be in tolerance, plumb, level; provide for secure anchoring, and in accordance with approved shop drawings.

3.02 INSTALLATION

- A. Install windows in accordance with manufacturer's recommendations and approved shop drawings with skilled craftspeople who have demonstrated a successful history of installing windows for ten (10) years.
- B. Provide required support and securely fasten and set windows plumb, square, and level without twist or bow.
- C. Apply sealant per sealant manufacturer's recommendations at joints, wipe off excess, and leave exposed sealant surfaces clean and smooth.

3.03 FIELD TESTING

- A. At Owner's discretion and expense, test installed units in conformance with AAMA 502-90 for air and water infiltration with the window manufacturer, Contractor, and Owner present.
- B. Select test units as directed by the Owner's representative and use an AAMA-accredited laboratory provided by the Owner or Contractor
- C. Failure of any units will be retested at the expense of the Contractor and window manufacturer in accordance to AAMA 502-90 guidelines.

3.04 ADJUSTING AND CLEANING

- A. Adjust windows as necessary for smooth and weathertight operation and leave windows clean and free of construction debris.

END OF SECTION

SECTION 08 71 02

DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes

1. Hardware for all new interior and exterior doors.
2. Refer to finish hardware and Door and Frame Schedule.

B. Related Sections

1. Section 01 21 00 – Allowances
2. Section 08 11 13 – Hollow Metal Doors and Frames
3. Section 08 14 16 – Flush Wood Doors
4. Section 08 14 33 – Stile and Rail Wood Doors

1.02 SUBMITTALS

A. Submit a digital copy of the following:

1. A schedule indicating type, manufacturer's name, manufacturer's number, location, and finish of each item required.
2. Photographic/graphic cut sheets for every item specified.
 - a. Bind cut sheets in a neat booklet.
 - b. Bind product cut sheets in the order the products are listed in Part 2 of this Section.
 - c. Clearly mark appropriate options or highlight options for Architect's selection.

B. Submittals failing to meet the above requirements will be rejected until all requirements are met.

C. In addition to the requirements above, the Contractor may be requested to provide additional technical literature, samples, drawings, and/or performance data to assist in the evaluation of proposed equals.

D. Secure Owner and Architect's approval before ordering hardware or templates.

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1.03 DELIVERY, STORAGE, AND HANDLING

- A. Provide storage and protection for finish hardware when delivered, and install it when ready.

1.04 QUALITY ASSURANCE

- A. Meet requirements and recommendations of applicable portions of standards listed.
 - 1. American Society for Testing and Materials, ASTM
 - 2. Commercial Standards, CS
 - 3. Standard Building Code, SBC
 - 4. Federal Specifications, FS
 - 5. Americans with Disabilities Act, Accessibility Guidelines, ADAAG
- B. The supplier of finish hardware shall strictly comply with the following requirements:
 - 1. Supplier shall have been in the full-time business of selling finish hardware for a minimum of ten (10) consecutive years.
 - 2. Supplier shall employ a full-time certified architectural hardware consultant (A.H.C.)
 - 3. Supplier shall be a member in good standing with D.H.I.
 - 4. Supplier shall be a factory-authorized dealer of approved hardware.
 - 5. Supplier shall be approved by the Owner and Architect.

1.05 GENERAL REQUIREMENTS

- A. Properly tag, index, and file keys as directed, and deliver all keys at completion of the work.
- B. Fire Underwriters' Labels: Provide only hardware having same U.L. Label and fire exposure time rating as doors and frames to which applied. This provision supersedes any hardware schedule provisions to the contrary.
- C. Any revisions of the hardware schedule to conform to the details shall be provided. Items not specifically mentioned but necessary for the completion of the work shall be furnished. It shall be the Contractor's responsibility to furnish hardware, in those places where specific hardware is not mentioned, of a quality equal to that of other openings used for the same general purpose. The cost of any such hardware shall be included in the original bid.

1.06 KEYING

- A. Key to "Best" systems as directed by Owner.

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- B. Furnish four (4) master keys and/or four (4) grand master keys. Furnish two (2) keys per lock otherwise.

1.07 COORDINATION

- A. Strictly coordinate machining of wood doors and preparation of hollow metal doors/frames with approved finished hardware schedule.

1.08 FINISHES

- A. Generally shall be dull chrome (26D) [typical] **[OR]** oil-rubbed bronze (10B) unless otherwise noted in the schedule.

PART 2 - PRODUCTS

2.01 DOOR HARDWARE

- A. Hinges: Equal to square edged, full mortise Hager BB 1279, 4-1/2" x 4-1/2".
- B. Spring hinges: Equal to square edged, full mortise Hager 1250, 4-1/2" x 4-1/2".
- C. Locksets: Equal to Best 45H, Sargent 8200, Schlage L9000 commercial heavy duty mortise locks:
 - 1. Best removable cores required.
 - a. Cylinders, cores, and core installation are to be purchased from Best under the allowance established in Section 01 21 00.
 - b. Locksets and panic devices shall be supplied less cores.
 - c. Installation and operational adjustments of cylinders in all locksets and panic devices is the responsibility of the Contractor, and the labor for such shall be included in the Base Bid.
 - d. Cylinders and construction cores shall be installed by the Contractor.
 - e. Permanent cores to be installed by Best as directed by the Owner.
 - 2. Function as per hardware schedule.
 - 3. Lever type design (ADA compliant equal to Best #14).
 - 4. Escutcheon equal to Best Type "J."
 - 5. Complete with strike.
- D. Deadbolts: Equal to Best 83T.
- E. Occupancy Indicator Deadbolts: Equal to Falcon D 871626 with 2³/₄" backset, ADA compliant lever, and external emergency release.

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- F. Hospital latches: Equal to Rockwood #596.
- G. Closers: Equal to Sargent 281 Powerglide Series, LCN 4040, Corbin Russwin DC8000 cast iron, standard duty (in Sargent line).
 - 1. Through bolt all closers.
- H. Exit Devices: Equal to Von Duprin 99/98, Sargent 8800/8700, Precision Apex 2000, 33/35 Series.
 - 1. Cylinders, cores, and core installation are to be purchased from Best under the allowance established in Section 01 21 00.
 - 2. Through bolt all exit device hardware.
 - 3. Cylinder dogging required with key (hex key is not acceptable).
- I. Flush Bolts: Equal to Rockwood 555.
- J. Surface Bolts: Equal to Rockwood 630.
- K. Hold Open Stops: Equal to Rockwood 461.
- L. Push Plates:
 - 1. Manufacturer: Rockwood, TRIMCO, or equal.
 - 2. Type: Equal to Rockwood 70F x RC, 8" x 16" push plate with rounded corners.
- M. Pull and Pull Plates:
 - 1. Manufacturer: Rockwood, TRIMCO, or equal.
 - 2. Type: Equal to Rockwood 111 x 70C.
- N. Kickplates:
 - 1. Equal to Rockwood or TRIMCO 8" high x width of door minus 2 inches.
 - 2. Thickness: 0.050 inch.
 - 3. Smooth finish.
- O. Doorstops:
 - 1. Manufacturer: Rockwood, TRIMCO, or equal.
 - 2. Type: Equal to Rockwood #440 Series. Provide complete with #449 riser if required for stable installation.
- P. Doorstops (wall mounted):

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1. Manufacturer: Rockwood, TRIMCO, or equal.
2. Type: Equal to Rockwood #406 Series, stainless steel [or] wrought bronze.

Q. Thresholds and weatherstripping:

1. Thresholds: PEMKO 2005AV or 181AV.
2. Ramped Thresholds: Equal to National Guard Products 952.
3. Weatherstripping: PEMKO 305CR (neoprene).
4. Door Bottom: PEMKO 211AV.

R. Silencers required at all hollow metal frames.

2.02 DOOR HARDWARE ACCESSORIES

- A. Key Cabinet (standard duty): Equal to Model 1010 by Salsbury Industries, Los Angeles, CA, phone 1-800-725-7287. Capacity for 200 keys, 20 gage steel construction, complete with lock and two keys. Verify location with Owner.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Provide storage and protection for finish hardware when delivered and install when ready.
- B. Fit all hardware accurately, apply securely, and adjust properly. Leave in good working order, free of defects.
- C. Properly tag, index, and file keys as directed, and deliver all keys at completion of the work.
- D. Apply hardware in accordance with manufacturer's instructions, fit accurately, apply securely and adjust carefully. Use care not to injure work when applying hardware. When necessary, remove and replace doors so they may have all surfaces painted.

3.02 APPLICATION OF HARDWARE

- A. Receive, store and be responsible for all finished hardware. Properly tag, index and file all keys in key cabinet or as directed. Apply hardware in accordance with manufacturer's instructions, fit accurately, apply securely and adjust carefully. Use care not to injure work when applying hardware. When necessary, remove and replace doors so they may have tops and bottoms painted or stained.
- B. The location of hardware in connection with wood doors and metal door bucks shall be as follows unless otherwise shown on the drawings:
 1. Center door knobs and levers 38 inches above finished floor.

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2. Center door pulls 40 inches above finished floor.
3. Center push plates 45 inches above finished floor.
4. Center cylinder dead bolt locks 52 inches above finished floor.
5. Center single push bars 48 inches above finished floor.
6. Locate upper edge of top hinges 5 inches below head of frame
7. Locate lower edge of bottom hinges 10 inches above finished floor.
8. Space center hinges equal distance between top and bottom hinges.

END OF SECTION

SECTION 08 81 00

GLASS GLAZING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Glass and glazing.

1.02 RELATED WORK

- A. Section 08 11 13 – Hollow Metal Doors and Frames
- B. Section 08 14 16 – Flush Wood Doors
- C. Section 07 92 00 – Joint Sealant

1.03 CODES AND STANDARDS

- A. Glass and glazing procedures must comply with requirements of International Building Code.
- B. Furnish/install tempered glass in locations required by codes.

1.04 WARRANTY

- A. Provide five (5) year manufacturer's warranty on glazing, one (1) year on parts, material, and installation. Warranty shall include coverage of sealed glass units from seal failure, interpane dusting or misting, and replacement of same.

PART 2 - PRODUCTS

2.01 GLAZING SCHEDULE

- A. All insulated glazing shall be 1" thick.
 - 1. Exterior pane: Graylite
 - 2. Interior pane:
 - a. Surface No. 3 shall be Solarban 60
 - b. Surface No. 4 shall be clear (unless scheduled to be frosted).
- B. All other interior glazing shall be clear.
- C. Glass shown on drawings as not tempered shall be tempered if required by code.
- D. All glazing in hollow metal frames, hollow metal doors, and solid wood core doors shall be with fire-rated and impact safety rated Firelite Plus by Technical Glass Products, SuperLite I-XL by SAFTIFIRST or equal as required by International Building Code.

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2.02 GLASS LEGEND

<u>Abbreviation</u>	<u>Type</u>
FI	Fire and Impact rated glazing
IGL	Insulated glazing
SG	Single pane glazing
FG	Frosted glazing
OG	Opaque glazing
LG	Laminated glazing

- A. Glass shown on drawings as not tempered shall be tempered if required by code.
- B. All glazing associated with restrooms shall be frosted unless noted otherwise.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Assure that openings conform with dimensions and tolerances shown on plans. All dimensions shall be field verified prior to fabrication.
- B. Check that surfaces to contact windows are free of debris.
- C. Do not proceed with installation until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Furnish and apply sealant that are compatible with window systems to provide a completely watertight installation at all joints. Wipe off excess sealant and leave exposed surfaces and joints clean, uniform, and smooth.

3.03 CLEANING

- A. Final cleaning of all glass shall be performed by the General Contractor.

END OF SECTION

SECTION 09 22 16.13
METAL STUD FRAMING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Top and bottom runners, studs, joists, internal bracing and blocking (interior and exterior), complete cold-formed steel framing system.
- B. Related Sections
 - 1. Section 06 10 00 – Rough Carpentry
 - 2. Section 09 52 00 – Suspended Gypsum Board Ceilings
 - 3. Section 09 29 01 – Interior Gypsum Board
 - 4. Section 09 29 02 – Exterior Gypsum Sheathing

1.02 REFERENCES

- A. ASTM C645 - Non-Load-bearing Steel Studs, Runners and Rigid Furring Channels.
- B. ASTM A 446-83 – Load-bearing Steel Studs.
- C. Gypsum Construction Handbook - 2nd Edition.
- D. GA 203 - Installation of Screw-Type Steel Framing Members to Receive Gypsum Board.

PART 2 - PRODUCTS

2.01 MATERIALS/GENERAL

- A. Steel framing shall be as manufactured by U.S. Gypsum Company, Clark Steel Framing, or equal.
- B. The cold-formed structural framing shall be manufactured from structural quality steel having minimum yield strength of 33KSI (230 Mpa), for all gauges, or optional 50 KSI (345 Mpa) for 16 GA and heavier and have minimum protection coating equal to G-60 galvanized finish. The steel shall conform to one of the following ASTM Standards: ASTM A 653, ASTM A875, ASTM A792, or ASTM A463.
- C. The structural framing shall meet ASTM C955, have engineering properties calculated in conformance with the AISI “Specification for the design of Cold-formed Structural Steel Members” and have minimum properties as published by Clark Steel Framing.

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- D. All structural framing accessories shall be formed from structural quality steel with minimum yield strength of 33 KSI (230 Mpa) and have minimum protective coating equal to G-60 galvanized finish.
- E. American Iron and Steel Institute (AISI) "Specification for the Design of Cold-Formed Steel Structural Members", latest edition.
- F. American Society for Testing and Materials (ASTM) Standard C955 – Standard Specification for Load Bearing (transverse and Axial) Steel Studs, Runners (Tracks), and Bracing of Bridging for Screw Application of Gypsum Board and Metal Plaster Bases.
- G. ASTM Standard C1007 – Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.

2.02 MATERIALS/SPECIFIC

- A. Interior studs shall be not less than 18 gauge at 16" o.c. Increase gauge to 16 at door jambs and heads.
- B. Exterior studs shall not be less than 16 gauge at 16" o.c.
- C. Ceiling and soffit systems for gypsum board shall be not less than 18 gauge channels or joists with 7/8" 20 gauge furring channels at 16" o.c.
- D. Metal Joists: Minimum of 16 gauge at 16" o.c. Align directly over metal studs when bearing on a wall assembly. Minimum of 16 gauge joists required at floor systems.
- E. Floor and ceiling runners shall be of same materials as studs and shall be designed to secure studs in place.
- F. Vertical deflection clips required as detailed on Drawings equal to those as manufactured by Signature Industries, the Steel Network: Verticlip SL, SLB, and SLS, Verticlip SLD, and Bridge Clip.

2.03 FASTENING

- A. Approved fasteners shall be devices recommended by stud system manufacturer in current printed instructions. Fasteners shall be stainless steel.
- B. Structural framing shall be properly spaced, plumbed, leveled, squared, fit properly against abutting members and held securely in place until permanently fastened. Wire tying of structural framing components is not permitted.
- C. Fastening of the cold-formed structural framing system shall be accomplished by screwing, power actuated fasteners, welding or a combination of methods. The type, size and spacing of the fasteners shall be required by the contract documents of approved connection details.
- D. Structural framing having protective coating removed by welding shall have the coating repaired, at the welds, by painting with a zinc rich primer.

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PART 3 - EXECUTION

3.01 ERECTION

- A. Secure top and bottom runners at 24 inches o.c. Align to configuration required.
- B. Install studs vertically at 16 inches oc and not more than 2 inches from abutting construction, each side of openings and at corners.
- C. Fit runners under and above openings; secure intermediate studs at spacing of wall studs.
- D. Brace stud framing system and make rigid.
- E. Coordinate erection of studs with installation of service utilities. Align stud web openings.
- F. Coordinate installation of bucks, anchors, blocking, electrical and mechanical work to be placed in or behind stud framing.
- G. Coordinate erection of stud system with requirements of door frame supports or attachments.
- H. Secure solid wood blocking to studs as required.
- I. Where a stud directly abuts an exterior wall, place a no. 15 asphalt felt strip between stud and wall surface.

3.02 TOLERANCES

- A. Install members to provide surface plane with maximum variation of 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 29 01
INTERIOR GYPSUM BOARD

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Interior Gypsum Board
 - 2. Taped and sanded joint treatment.
- B. Related Sections
 - 1. Section 06 10 00 – Rough Carpentry
 - 2. Section 09 22 16.13 – Non Structural Metal Stud Framing
 - 3. Section 09 28 16 – Glass-Mat Faced Gypsum Backing Board
 - 4. Section 09 91 00 – Paint

1.02 REFERENCES

- A. GA 214-10 – Recommended Levels of Gypsum Board Finish
- B. GA 216 - Recommended specifications for the application and finishing of Gypsum Board.
- C. GA 252 - Recommended specifications for the application of gypsum sheathing.
- D. USG-Gypsum Construction Handbook.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Handle materials with care to prevent damage.
- B. Store materials inside under cover, stack flat off floor.
- C. Store adhesives in a dry area; provide protection against freezing at all times.

PART 2 - PRODUCTS

2.01 GYPSUM BOARD

- A. Provide Gypsum board materials in accordance with recommendations of GA 216.
- B. Parperless gypsum board: Equal to DensArmor Plus High-Performance Interior Panel by Georgia Pacific.
- C. Thickness: 5/8", Type X

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2.02 GYPSUM BOARD ACCESSORIES

- A. Provide gypsum board accessories in accordance with GA 216.
- B. Reinforcing tape, joint compound, adhesive, water, fasteners: GA 216.
- C. Corner Beads: Metal.
- D. "F" molding: Gordon FD5810 or equal.
- E. "J" molding: Gordon JD-58 or equal.
- F. Screws: ASTM C1002:
 - 1. For Metal Studs 20 ga. – 25 ga.: Equal to Grabber Bugle Head Streaker Fasteners. Black/Gray Phosphate
 - 2. For Metal Studs 14 – 20 ga.: Equal to Grabber Bugle Head Drivall Self Drilling. Black/Gray Phosphate

PART 3 - EXECUTION

3.01 GYPSUM BOARD INSTALLATION

- A. Install gypsum board in accordance with recommendations of GA 216.
- B. Provide and install control joints in large continuous areas to prevent cracking.
- C. Erect single layer standard gypsum board in direction most practical and economical, with ends and edges occurring over firm bearing.
- D. Erect single layer fire rated gypsum board vertically, with edges and ends occurring on firm bearing.
- E. Use screws when fastening gypsum board to metal furring or framing.
- F. In locations where gypsum board abuts a dissimilar material, apply J mould to terminate the gypsum board and install caulking at the crack between the gypsum board and dissimilar materials.
- G. Abut gypsum board to floor for a tight joint to avoid gaps between the wall and floor surfaces.
- H. Place corner beads at external corners. Use longest practical lengths. Place edge trim where gypsum board abuts dissimilar materials.
- I. Tape, fill and sand exposed joints, edges, corners, openings and fixings, to produce surface ready to receive surface finishes. Feather coats onto adjoining surfaces so that camber is maximum 1/32 inch.
- J. Install wall and ceiling control joints at 30 feet o.c. each way.

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- K. Remove and re-do defective work.

3.02 CLOSING IN UNINSPECTED WORK

- A. Do not cover up or enclose work until it has been properly and completely inspected and reviewed. Should any of the work be covered up or enclosed prior to verification, uncover the work as required for inspection. Make all repairs and replacements with such materials and workmanship as are necessary at no additional cost to the owner.

3.03 FINISHING

- A. Provide levels of gypsum finish for locations as follows, in accordance with Gypsum Association GA 214-10, "Recommended Levels of Gypsum Board Finish".
1. Level 1: Above lay-in ceilings and concealed areas, except provide higher level of finish as required to comply with fire resistance ratings and acoustical ratings.
 2. Level 2: At water-resistant gypsum backing board (ASTM C 630) is used as a substrate for tile, except remove tool marks and ridges. Provide higher level of finish as required to comply with fire resistance ratings and acoustical ratings.
 3. Level 3: At gypsum board to receive heavy or medium texture (spray or hand applied) finishes before final painting, or where heavy-grade wallcoverings are to be applied. Provide higher level of finish as required to comply with fire resistance ratings and acoustical ratings. (Paint Primer as required in Specification Section 09 91 00 or USG First Coat Primer)
 4. Level 4: At gypsum board to receive flat paints, light textures, or wallcoverings. Provide higher level of finish as required to comply with fire resistance ratings and acoustical ratings. (Paint Primer as required in Specification Section 09 91 00 or USG First Coat Primer)
 5. Level 5: At all gypsum board to receive eggshell, gloss, semi-gloss, satin, or enamel paints. Spray-applied primer-surfacer, TUFF-HIDE or watered-down joint compound skim coat over whole surface. Provide higher level of finish as required to comply with fire resistance ratings and acoustical ratings. (In addition to primer-surfacer, a paint primer shall be required as specified in Specification Section 09 91 00.)

END OF SECTION

SECTION 09 29 02
EXTERIOR GYPSUM SHEATHING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Fiberglass – mat faced, moisture and mold resistant gypsum sheathing.
- B. Related Sections
 - 1. Section 04 05 19 – Masonry Anchorage and Reinforcing
 - 2. Section 05 40 00 – Cold-Formed Metal Framing
 - 3. Section 06 10 00 – Rough Carpentry
 - 4. Section 07 21 00 – Thermal Insulation
 - 5. Section 07 27 26 – Fluid Applied Membrane Air Barriers

1.02 REFERENCES

- A. ASTM C473 Standard Test Methods for Physical Testing of Gypsum Panel Products.
- B. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- C. ASTM C1002 Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
- D. ASTM C1177 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- E. ASTM C1280 Standard Specification for Application of Gypsum Sheathing.
- F. ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
- G. ASTM D6329 Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers.
- H. ASTM E72 Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
- I. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.
- J. Gypsum Association (GA): GA-253 Application of Gypsum Sheathing.

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1.03 SUBMITTALS

- A. Submit Product Data with manufacturer's specifications and installation instructions for each product specified.

1.04 WARRANTY

- A. Provide products that offer twelve months of coverage against in-place exposure damage (delamination, deterioration and decay).
- B. Manufacturer's Warranty:
 - 1. Five years against manufacturing defects.
 - 2. Ten years against manufacturing defects when used as a substrate in architecturally specified EIFS.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Basis of Design:
 - 1. Fiberglass-Mat Faced Gypsum Sheathing, 5/8" DensGlass Sheathing by Georgia-Pacific Gypsum LLC.
 - 2. Fiberglass-Mat Faced Gypsum Sheathing, Type X for Fire Rated Designs: DensGlass Fireguard Sheathing.
- B. Equivalent Design: Manufacturer with products of equivalent design may include, but are not limited to:
 - 1. National Gypsum Company
 - 2. USG Corporation
 - 3. Certain Teed Gypsum, Inc.

2.02 EXTERIOR GYPSUM SHEATHING:

- A. Exterior Gypsum Sheathing (Non-Rated)
 - 1. Thickness: 5/8 inch thick.
 - 2. Width: 4 feet
 - 3. Length: 8 feetType X.
 - 4. Edges: Square
 - 5. Surfacing: Fiberglass mat on face, back, and long edges.

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6. Racking Strength (Ultimate, not design value) (ASTM E72): Not less than 540 pounds per square foot, dry.
 7. Flexural Strength, Parallel (ASTM C473): 80 lbf, parallel.
 8. Humidified Deflection ASTM C1177): Not more than 2/8 inch.
 9. Permeance (ASTM E96): 23 perms.
 10. R-Value (ASTM C518): 0.56.
 11. Mold Resistance (ASTM D3273): 10, in a test as manufactured.
 12. Microbial Resistance (ASTM D6329, GREENGUARD 3-week protocol): Will not support microbial growth.
- B. Fire-Rated Fiberglass-Mat Faced Gypsum Sheathing: ASTM C1177, Type X:
1. Thickness: 5/8 inch.
 2. Width: 4 feet.
 3. Length: 8 feet
 4. Weight: 2.5 lb/sq. ft.
 5. Edges: Square.
 6. Surfacing: Fiberglass mat on face, back, and long edges.
 7. Racking Strength (Ultimate, not design value) (ASTM E72): Not less than 654 pounds per square foot, dry.
 8. Flexural Strength, Parallel (ASTM C1177): 100 lbf, parallel.
 9. Humidified Deflection (ASTM C1177): Not more than 1/8 inch.
 10. Permeance (ASTM E96): Not more than 17 perms.
 11. R-Value (ASTM C518): 0.67.
 12. Mold Resistance (ASTM D3273): 10, in a test as manufactured.
 13. Microbial Resistance (ASTM D6329, GREENGUARD 3-week protocol): Will not support microbial growth.
- C. Exterior gypsum soffit board:
1. Fiberglass-Mat Faced Gypsum Backing Board, 5/8" DensGlass Sheathing by Georgia-Pacific Gypsum LLC.

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2.03 GYPSUM BOARD ACCESSORIES

- A. Provide gypsum board accessories in accordance with GA 216.
- B. Reinforcing tape, joint compound, adhesive, water, fasteners: GA 216.
- C. Corner Beads: Metal.
- D. "F" molding: Gordon FD5810 or equal.
- E. "J" molding: Gordon JD-58 or equal.
- F. "R" reveal molding: Gordon RD5812 or equal.
- G. "T" molding: Gordon TD-58 or equal.
- H. Screws: ASTM C1002.
 - 1. Equal to Strong-Point 410 Stainless Steel Self-Drilling Flat Head, Passivated and Waxed

PART 3 - EXECUTION

3.01 EXTERIOR SHEATHING INSTALLATION

- A. Provide exterior sheathing where indicated on drawings. Install sheathing in accordance with manufacturer's instructions and applicable instructions in GA-253 and ASTM C 1280.
- B. Install DensGlass Gold Exterior Sheathing with gold side out.
- C. Use maximum length possible to minimize number of joints.
- D. Metal framing: Attach exterior sheathing to metal framing with self-tapping screws conforming to ASTM C1002 spaced 8" o.c. at perimeter where there are framing supports; and 8" o.c. along intermediate framing in field.
- E. Locate fasteners minimum 3/8" from edges and ends of sheathing panels.
- F. Treatment of joints:
 - 1. Exterior face of exterior gypsum sheathing joints shall be taped with FG tape and troweled with Dow Corning 795 building sealant or equal.
 - 2. Joints and fasteners shall be covered using Dow Corning 795 Building Sealant or equal.

END OF SECTION

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SECTION 09 30 13

TILING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Preparation of substrate for ceramic tile installation.
- B. Furnish and install thin-set ceramic wall and floor tile complete with incidentals.
- C. Furnish and install cement backer board panels and underlayment for the substrate.
- D. Furnish and install marble thresholds at junction of tile floors with dissimilar materials.
- E. Furnish and install membrane underlayment membrane.

1.02 RELATED SECTIONS

- A. Section 03 30 00 - Cast-in-Place Concrete
- B. Section 07 92 00 – Joint Sealants
- C. Section 09 28 16 – Glass-Mat Faced Gypsum Backing Board
- D. Section 09 30 13.01 – Tile Accessories

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM)
- B. American National Standards Institute. (ANSI)
- C. Tile Council of America (TCA) Handbook for Ceramic Tile Installation.

1.04 SUBMITTALS

- A. Submit product literature and samples for Architect's approval.
- B. Submit samples of actual tile for color selection by Owner.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

PART 2 - PRODUCTS

2.01 ACCEPTABLE TILE MANUFACTURERS

- A. American Olean **(BASIS OF DESIGN)**

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- B. Crossville
- C. Daltile
- D. Florida Tile
- E. Summitville
- F. Approved Equal.

2.02 TILE MANUFACTURER, COLOR, SIZE, AND PATTERN

- A. Refer to Finish Legend and interior elevation in the drawings for wall tile pattern.

- 1. Wall Tile (CT-1):

- a. Collection: Color Story Wall by American Olean
 - b. Color: Stable (0052)
 - c. Size: 3"x 6"
 - d. Finish: Matte

- 2. Floor Tile (PT-1):

- a. Collection: Color Story Unglazed Mosaics by American Olean
 - b. Color: Light Smoke (A04), Speckled
 - c. Size: 2" Mosaic
 - d. Finish: Matte

2.03 INSTALLATION MATERIALS (THIN-SET METHOD)

- A. See 09 30 13.01 – Tile Accessories.

2.04 MEMBRANE

- A. See 09 30 13.01 – Tile Accessories

2.05 GROUT

- A. See 09 30 13.01 – Tile Accessories

2.06 ACCESSORIES

- A. See 09 30 13.01 – Tile Accessories

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PART 3 - EXECUTION

3.01 INSPECTION/PREPARATION

- A. Installer must examine the substrates and conditions upon which the ceramic tile is to be installed and take necessary measures to correct conditions detrimental to the work. Do not proceed with the installation of ceramic tile until unsatisfactory conditions have been corrected. Initiation of tile setting work represent acceptance of substrate.
- B. Review and strictly follow all manufacturer's installation guidelines.

3.02 INSTALLATION

- A. Slope setting beds to drains.
- B. Cut and fit tile tight to protrusions and vertical interruptions. Form corners and bases neatly.
- C. Work tile joints uniform in width, subject to variance in tolerance allowed in tile size. Joints: Watertight, without voids, cracks, excess mortar, or grout.
- D. Allow tile to set for a minimum of 48 hours prior to grouting.
- E. Provide and install marble threshold at junction with dissimilar materials.

3.03 PROTECTION

- A. Prohibit traffic from floor finish for 48 hours after installation.

END OF SECTION

SECTION 09 30 13.01
TILING ACCESSORIES

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Edge protection and transition profiles for floors.
- B. Finishing and edge protection profiles for walls.
- C. Movement joint and cove shaped profiles.
- D. Uncoupling membrane **at all tile floors.**
- E. Waterproofing membrane **at all tile walls.**
- F. Floor drain, with integrated bonding flange.
- G. Setting materials: adhesives, mortars, grouts, and sealants.

1.02 RELATED SECTIONS

- A. 03 30 00 - Cast in Place Concrete
- B. 09 30 13 - Tiling
- C. 09 28 16 - Glass-Mat Faced Gypsum Backing Board

1.03 REFERENCES

- A. Strictly comply with latest edition of Handbook for Ceramic Tile Installation, by the Tile Council of America.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.05 SUBMITTALS

- A. Submit manufacture's product data on all materials used.
- B. Submit samples for Architect's approval.

1.06 QUALITY ASSURANCE

- A. Manufacture Qualifications: Company specializing in manufacturing products specified in this section with a minimum ten years' experience.

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- B. Installer Qualifications: Company specializing in performing the work of this section with a minimum of five years' experience.
- C. Source Limitations: Obtain products of uniform quality from a single manufacture.
- D. Preinstallation Conference
 - 1. General Contractor/Construction Manager shall schedule and conduct conference.
 - 2. Require attendance of tile accessories supplier, tile supplier, tile installer, and installers of related work. Review installation procedures and coordination required with related work.
 - 3. Meeting agenda shall include, but not be limited to:
 - a. Surface preparation.
 - b. Tile and installation material compatibility.
 - c. Edge protection, transition, and prefabricated movement joints.
 - d. Waterproofing installation.
 - e. Crack isolation installation.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacture's unopened packaging until ready for installation.
- B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.
- C. Store materials in a dry, warm, ventilated weathertight location.

1.08 COORDINATION

- A. Coordinate work with other operations and installation of floor finish materials to avoid damage to installed materials.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of design Schluter Systems L.P. 194 Pleasant Ridge Road, Plattsburgh, NY 12901-5841. Phone: (800) 472-4588 www.schluter.com
- B. Laticrete International, Inc
- C. USG Corporation

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D. Approved Equal. See Section 01630 Product Substitution Procedures.

2.02 EDGE PROTECTION AND TRANSITION PROFILES

- A. Schluter®-RENO-T
- B. Schluter®-RENO-U
- C. Schluter®-RONDEC
- D. Schluter®-DILEX-AHK
- E. Provide system with matching inside corners, outside corners, and internal connectors
- F. Material Finish: AE – Satin Anodized Aluminum
- G. Height as required

2.03 MOVEMENT JOINTS

- A. Provide Schluter®-DILEX-AKWS at all tile floors over expansion/construction joints.
- B. Material Finish: AE – Satin Anodized Aluminum
- C. Height as required

2.04 SETTING MATERIALS

- A. Schluter®-SET
 - 1. Description: premium unmodified sag-resistant thin-set mortar specifically formulated for use with Schluter membranes and boards. Schluter®-SET is suitable for use with ceramic, porcelain, and stone tile, including large and heavy tile, in conjunction with Schluter®- Systems' uncoupling and waterproofing membranes. Meets the requirements of ANSI A118.1T.
 - 2. Color: Grey

2.05 WATERPROOFING MEMBRANE

- A. Provide Schluter®-KERDI behind **all tile on all walls.**
 - 1. Description: 0.008" (8 mil) thick, orange polyethylene membrane, with polypropylene fleece laminated on both sides, which meets or exceeds the requirements of the "American national standard specifications for load bearing, bonded, waterproof membranes for thin-set ceramic tile and dimension stone installation A118.10," and is listed by cUPC®, and is evaluated by ICC-ES (see Report No. ESR-2467 and PMG 1204).
 - 2. Waterproofing seaming membrane:

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- a. Provide Schluter®-KERDI-BAND Seams and Corners material 0.004" (4 mil) thick, orange polyethylene membrane, with polypropylene fleece laminated on both sides.

3. Waterproofing Accessories:

- a. Provide Schluter®-KERD-SEAL Mixing Valve seals
- b. Provide Schluter®-KERD-SEAL pipe seals

2.06 GROUT

A. Equal to Laticrete

1. Grout (GR-1)

- a. Epoxy, Unsanded
- b. Grout Joint Width: 1/16"
- c. Color: Mink (95)

PART 3 - EXECUTION

3.01 INSPECTION/PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Review and strictly follow all manufacturer's installation guidelines for surface preparation.

3.02 INSTALLATION

- A. Install materials in strict accordance with manufacturer's recommendations.
- B. Slope setting beds to drains.

END OF SECTION

SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Suspended metal grid system complete with wall trim.
 - 2. 2 x 2 lay-in ceiling tiles.
- B. Related work:
 - 1. Section 07 21 00 – Building Insulation
 - 2. Section 09 29 01 – Interior Gypsum Board
 - 3. Division 23 - 28 – Electrical/Mechanical

1.02 SUBMITTALS

- A. Submit detailed product literature to Architect for review.
- B. Submit product samples to Architect for review.

1.03 QUALITY ASSURANCE

- A. Applicator:
 - 1. Shall be approved by the manufacturer.
 - 2. Shall have satisfactorily completed a minimum of 20 installations.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Do not install acoustical ceilings until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead mechanical work is completed, tested and approved.
- B. Permit wet work to dry prior to commencement of installation.
- C. Maintain uniform temperatures of minimum 61 degrees F. and humidity of 20 percent to 40 percent prior to, during and after installation.

1.05 WARRANTY

- A. 10-year limited warranty on ceiling tiles.

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PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Armstrong.
- B. BPB (Celotex).
- C. Companies with similar experience and expertise.

2.02 SUSPENSION SYSTEM

- A. Standard interior suspension system:
 - 1. Equal to Armstrong Prelude 15/16 inch exposed inverted “tee” with Humiguard Plus performance.
 - 2. Conforms to ASTM C-635 medium duty system.
 - 3. Grid: Exposed tee, all components die cut and interlocking.
 - 4. Accessories: Splices, edge moldings, hold down clips as required to complete and complement suspended ceiling grid system.
 - 5. Materials: 0.020 gauge commercial quality cold-rolled steel; off white enamel finish on exposed surfaces, typical.

2.03 STANDARD LAY-IN PANELS

- A. Acoustical tile panels LAT-1: TYPE I
 - 1. Equal to Fine Fissured 1728 by Armstrong with Humiguard Plus Performance and BioBlock paint on front and back.
 - 2. Mineral fiber composition.
 - 3. 24" x 24" x 5/8" thick, square edge.
 - 4. Finish: Factory-applied Acrylic latex paint
 - 5. NRC: 0.55
 - 6. CAC: 33
 - 7. Fire Rating: Class A
 - 8. Light reflectance 0.85.
 - 9. UL Classified
 - 10. Provide Owner with two (2) extra package of replacement ceiling tile at project completion.

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B. Acoustical tile panel LAT-2: TYPE II

1. Equal to "Optioma Open Plan 3152" by Armstrong with Humiguard Plus Performance and BioBlock paint on front and back.
2. Fiberglass composition.
3. Size: 24" x 24" x 1"; square edge.
4. Finish: Factory-applied Acrylic latex paint.
5. NRC: 0.95
6. AC: 190
7. Fire Rating: Class A
8. Light reflectance 0.90
9. UL Classified
10. Provide Owner with one (1) extra package of replacement ceiling tile at project completion.

C. Acoustical tile panel LAT-3: TYPE III

1. Equal to Cirrus Tegular 584 by Armstrong with Humiguard Plus Performance and BioBlock paint on front and back.
2. Mineral fiber composition.
3. 24" x 24" x 3/4" thick.
4. Finish: Factory-applied Acrylic latex paint.
5. NRC: 0.70
6. CAC: 35
7. Fire Rating: Class A
8. Light reflectance 0.86.
9. UL Classified.
10. Provide Owner with one (1) extra package of replacement ceiling tile at project completion.

D. Acoustical tile panel LAT-4: TYPE IV

1. Equal to Clean Room VL 868 by Armstrong with Humiguard Plus Performance, Fire Guard Performance and BioBlock paint.

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2. Mineral fiber composition.
 3. 24" x 24" x 5/8" thick.
 4. Finish: Special vinyl-faced, non-perforated square cut lay-in panel.
 5. NRC: N/A
 6. CAC: 40
 7. Fire Rating: Fire Guard.
 8. Light reflectance 0.80.
 9. UL Classified
 10. Provide Owner with one (1) extra package of replacement ceiling tile at project completion.
- E. Tectum Clouds at Weight Rooms: TYPE V
1. Equal to Tectum by Armstrong, radius edges, 1-1/2" thick shapes as shown in drawings with Humiguard. Color to be custom color (Sherwin Williams colors) as selected by the owner. Multiple color to be selected. Refer to reflected ceiling plans for clous size. Include suspension system and accessories.
- F. Provide Owner with two (2) extra packages of replacement ceiling tile per each type per building at project completion.

PART 3 - EXECUTION

3.01 COORDINATION

- A. Electrical and mechanical work above suspended ceiling must be strictly coordinated with the work of this section.

3.02 INSTALLATION

- A. Install suspended ceiling systems in accordance with manufacturer's recommendations to produce finished ceiling true to lines and levels and free from warped, soiled or damaged grid or lay-in panels.
- B. Install ceiling systems in a manner capable of supporting all superimposed loads, with maximum permissible deflection of 1/360 of span and maximum surface deviation of 1/8 inch in 10 feet.
- C. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- D. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest adjacent hangers and related carrying channels as required to span the required distance.

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- E. Supply hangers or inserts for installation to the respective section in ample time and with clear instructions for their correct placement. Provide additional hangers and inserts as required.
- F. Hang independently of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of the longitudinal axis or face plane of adjacent members.
- G. Center ceiling systems on room axis leaving equal border pieces.
- H. Do not support fixtures from or on main runners or cross runners if weight of the fixture causes the total dead load to exceed the deflection capability. In such cases, support fixture loads by supplementary hangers located within 6 inches of each corner, or support the fixtures independently.
- I. Do not install fixtures so that main runners and cross runners will be eccentrically loaded. Where fixture installation would produce rotation of runners, provide stabilizer bars.
- J. Install edge moldings at intersection of ceiling and vertical surfaces, using maximum lengths, straight, true to line and level. Miter corners. Provide edge moldings at junctions with other ceiling finishes.
- K. Fit acoustic lay-in panels in place, free from damaged edges or other defects detrimental to appearance and function.
- L. Install lay-in panels level, in uniform place and free from twist, warp, and dents.
- M. Prior to beginning installation, verify that required ceiling height does not conflict with work in place or scheduled for execution.

3.03 ADJUSTMENTS/CLEANING

- A. Adjust any sags or twists which develop in the ceiling system and replace any part which is damaged or faulty.

END OF SECTION

SECTION 09 65 13.13

RESILIENT BASE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Preparation of substrate surfaces.
- B. Provide and install rubber base (refer to Room Finish Schedule).
- C. Cleaning of all surfaces and areas of work.

1.02 REFERENCES

- A. FS SS-W-40 - Wall Base: Rubber and Vinyl Plastic.

1.03 SUBMITTALS

- A. Include samples of each base material, and color selected.

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Maintain minimum 70 degrees F. air temperature at flooring installation area for three days prior to, during and for 24 hours after installation.
- B. Store flooring materials in area of application. Allow three days for material to reach equal temperature as area.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Flexco (**BASIS of DESIGN**)
- B. Johnsonite
- C. Roppe

2.02 MATERIALS

- A. Base: Conforming to FS SS-W-40, rubber, rolled, (48" pieces are allowed in special situations with Architect's approval), 4 inch high, 1/8 inch thick including pre-molded end stops and external corners.
 - 1. RB-1: 078 Umber
- B. Rubber Base Adhesive: As recommended by base manufacturer.

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PART 3 - EXECUTION

3.01 INSTALLATION

- A. If existing spaces include new partitions which require new rubber base, the contractor shall replace all room rubber base to ensure a uniform and complete installation.
- B. Fit joints tight and vertical. Maintain minimum measurement of 18 inches between joints.
- C. Miter internal corners.
- D. Install base on solid backing. Adhere tightly to wall and floor surfaces.
- E. Scribe and fit to door frames and other obstructions.
- F. Install straight and level to variation of plus or minus 1/8 inch over 10 feet.
- G. Take special care to avoid glue smears on finished walls and on carpet.
- H. Rubber cove base (4") required at all base cabinets.

END OF SECTION

SECTION 09 65 68
RUBBER ATHLETIC FLOORING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Provide and install rubber flooring tile as shown in the drawings.

1.02 RELATED SECTIONS

- A. Section 03 30 00 – Cast-in-Place Concrete

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide resilient flooring manufactured by a firm with a minimum of 10 years' experience with resilient flooring of type equivalent to those specified.
 - 1. Manufacturer's quality management system must have ISO 9001:2000 approval.
 - 2. Provide resilient flooring products and accessories from one manufacturer to ensure compatibility.
 - 3. Manufacturer shall be capable of providing technical training and technical field service representation.
- B. Installer Qualifications: Installer Qualifications: Acceptable to manufacturer of resilient flooring or INSTALL (International Standards & Training Alliance) resilient certified for the requirements of the project with a minimum of 4 years' experience with resilient flooring of type equivalent to those specified.
 - 1. It is recommended to have a minimum of one installer per working party with the ability to provide proof of current credentials on request.
 - 2. Has obtained and maintained current credentials from the manufacturer's training program.
 - 3. Installers shall be able to exhibit proficient skills with flash cove detailing, both hot and cold-welding techniques, adhesives, specialty adhesive systems and seam cutting.
 - 4. The installing parties shall provide a submittal of their skills in the form of mock-ups of the specified material. These mock-ups will be accepted as proof of their skills and benchmarking for the proposed project.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, installation instructions, and maintenance guidelines for each material and accessory proposed for use.

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- B. Samples: Submit three representative samples of each product specified for verification.

1.05 DELIVERY AND STORAGE

- A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's recommendations. Protect from damage due to weather, excessive temperatures, and construction operations.
- B. Deliver materials sufficiently in advance of installation to condition materials to the required temperature for 48-hours prior to installation.

1.06 SITE CONDITIONS

- A. The installation area must be fully enclosed, weathertight, and climate controlled between 63°F and 75°F and 40% to 60% ambient relative humidity (RH) for at least 48 hours prior, during, and 72 hours after installation (do not use gas fueled blowers).
- B. Dew Point must be avoided. The substrate must be at least 5°F above dew point to be considered acceptable.
- C. Flooring should not be installed before the concrete subfloor has cured for a minimum of thirty (30) days.
- D. Moisture vapor emission content of the concrete slab must not exceed 3 pounds per 1000 sf in 24 hours when using the calcium chloride test as per ASTM 1869-98.
- E. Installation of the rubber flooring shall only commence once all work related to other craftsmen and trades has been completed.

1.07 WARRANTY

- A. 15 Year Limited Wear Warranty

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Nora Systems, Inc. (**BASIS of DESIGN**), 9 Northeastern Blvd., Salem, NH 03079; telephone (800) 332-NORA or (603) 894-1021.
- B. Or equal

2.02 RUBBER FLOOR TILE

- A. Basis of Design: norament® satura™, Article 1880
- B. Thickness: 1/4"
- C. Profile: Square
- D. Size: 40" x 40"

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- E. Surface: Hammered
- F. Back of Tile: Double Sanded Smooth
- G. Color:
 - 1. Pre-Selected RF-1: Orion (5109)
 - 2. Pre-Selected RF-2 Ara (5110)

2.03 RUBBER FLOOR TILE PERFORMANCE STANDARDS:

- A. Rubber floor tile must meet the following performance standards:
 - 1. Dimensional Stability (ASTM F2199: $\leq 0.15\%$ in both directions)
 - 2. Flammability (E648/NFPA 253): ≥ 0.45 watts/sq cm for Class 1
 - a. 0.94
 - 3. Smoke Density (ASTM E662): < 450 is required
 - a. 296 (flaming) and 16 (non-flaming)
 - 4. Surface Burning (CAN/ULC-S102.2):
 - a. FSR of 70 and SDC of 470
 - 5. Burn Resistance (DIN EN 1399):
 - a. Resistant to cigarette and solder burns
 - 6. Slip Resistance (ASTM D2047): ≥ 0.5 is required
 - a. Static coefficient of friction, Neolite dry 0.99, Neolite wet 0.95
 - 7. Bacteria Resistance (ASTM E2180/ASTM G21):
 - a. Resistant to bacteria, fungi, and micro-organism activity
 - 8. Latex Allergies (ASTM D6499):
 - a. Inhibition ELISA, results are below
 - 9. Sound Absorption (ASTM E2179/ISO 10140-3):
 - a. Δ IIC 18, Δ Lw 11 dB (compare only Δ values)
 - 10. Sound Generation:
 - a. 66.3 dBA, 68.5 dBC and 19.6 Sones, independently tested

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11. Hardness (ASTM D2240): ≥ 70 is required
 - a. Shore type A, 82
12. Static Load (ASTM F970): ≤ 0.005 in with 250 lbs is required
 - a. Residual compression of 0.005 in with 800 lbs
13. Rolling Load Limit (ASTM F2753):
 - a. ≤ 850 lbs/sq in; for forklift traffic nora polyurethane adhesive is required
14. Abrasion Resistance (ASTM D3389): ≤ 0.035 oz (1.0 g) is required
 - a. 1.1 lbs (500 g) load on H-18 wheel with 1000 cycles, 0.002 oz (0.05 g) weight loss
15. Oil & Grease Resistance (ISO 26987):
 - a. Yes
16. Heat Resistance (ASTM F1514): Avg. $\Delta E \leq 8.0$ is required
 - a. Easily achieved with all batches and regular maintenance
17. Static Generation (AATCC 134):
 - a. < 1000 Volts at 20% RH
18. Thermal Transmission (ASTM C518):
 - a. R-value of -0.90
19. Embodied Carbon (Cradle to Gate):
 - a. 17.2 kg CO₂e/m³
20. Indoor Air Quality:
 - a. GREENGUARD Gold Certified; CDPH 01350 compliant
21. Disclosure of Environmental Impacts:
 - a. Environmental Product Declaration (EPD)
22. Disclosure of Product Ingredients:
 - a. Health Product Declaration (HPD)
23. Additional Certification and Transparency Documentation:
 - a. • Cradle to Cradle Certified Silver

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- b. • Greenhealth Approved

24. LEED v4: Contributes to multiple IEQ and MR credits

- a. Contributes to multiple IEQ and MR credits

2.04 ADHESIVE

- A. As recommended by the Manufacturer.

2.05 MAINTENANCE

- A. Clean:

- 1. Clean and maintain effectively using water, nora® pads, and a suitable cleaning machine, without the use of any factory and/or field-applied coatings. Also, without using any chemicals that may be hazardous or containing any teratogenic, mutagenic, or any other ingredients known to be carcinogenic. Refer to nora Maintenance Guidelines for product specific details.

- B. Shine:

- 1. Higher shine achieved by buffing without any artificial topical applied coatings.

- C. Stain Removal:

- 1. Samples of the product must be provided for stain removal testing by the owner. Sample size must be 40" x 40", pre-cleaned by manufacturer per published recommendations. Samples must have no coatings, sealers, floor finish or other manually or mechanically applied finish on the surface of the product. Stain testing must consist of application of common healthcare related disinfectants and chemicals to include, but not limited to, Betadine, Methylene Blue, Silver Nitrate, and alcohol-based hand sanitizer. Duration of test period must be no less than one week. Removal of chemicals must be in accordance with manufacturers published cleaning and maintenance recommendations.

- D. Provide to the Owner additional amounts of flooring representing 2% of the total surface of each type and color.

- E. Maintenance material must be from the same dye lot.

PART 3 - EXECUTION

3.01 SUBSTRATE PREPARATION

- A. Per ASTM F710 and the nora® Installation Instructions.
- B. Remove ridges and bumps. Fill low spots, cracks, joints, holes and other defects with patching compound.

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- C. Clean floor and apply and float filler to leave smooth, flat, hard surface. Prohibit traffic until filler is cured.
- D. The subfloor is to be prepared as per manufacturer's recommendations.

3.02 INSTALLATION

- A. Provide trained installers that have at least one of the following:
 - 1. Approved by specified manufacturer (nora systems, Inc.) or INSTALL (International Standards & Training Alliance) certified for the requirements of the project.
 - 2. It is recommended to have a minimum of one installer per working party with the ability to provide proof of current credentials on request.
 - 3. An effective installation manager to manage the project, installers, and ensure that all the required procedures are followed as detailed in the nora Installation Instructions (available at www.nora.com).
- B. Follow all requirements in the appropriate nora Installation Instructions.

END OF SECTION

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SECTION 09 91 00

PAINT

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Preparation of interior and exterior surfaces to receive paint, stain and sealant.
- B. Prime and paint the following interior materials and items (see Room Finish Schedule):
 - 1. All hollow metal frames.
 - 2. All gypsum board walls, furr-downs, and exposed gypsum board ceilings.
 - 3. All exposed concrete masonry units.
 - 4. All exposed metal fabrications.
 - 5. All flush wood doors.
 - 6. All wood-veneer faced architectural cabinets.
- C. Prime and paint the following exterior materials and items:
 - 1. All hollow metal frames and doors.
 - 2. All exposed metal fabrications.
 - 3. Exterior wood.
 - 4. Exterior soffit.
 - 5. All roof penetrations to match color of roof.

1.02 RELATED WORK

- A. Section 07 92 00 – Joint Sealant

1.03 QUALITY ASSURANCE

- A. Include on Label of Containers:
 - 1. Manufacturer's Name.
 - 2. Type of Paint.
 - 3. Manufacturer's stock number.
 - 4. Color.

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1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver paint materials in sealed original labeled containers, bearing manufacturer's name, type of paint, brand name, color designation and instructions for mixing and or reducing.
- B. Provide adequate storage facilities. Store paint material at minimum ambient temperature of 45 degrees F in well ventilated area.
- C. Take precautionary measures to prevent fire hazards and spontaneous combustions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Sherwin Williams. **(BASIS OF DESIGN)**
- B. Devoe.
- C. Benjamin Moore.
- D. Pittsburgh Paint.
- E. Farrell Calhoun
- F. Approved Equal.

2.02 MATERIALS

- A. Paint, varnish, stain, enamel and fillers: Type and blend listed herein or equivalent products approved by Architect. Prime/paint schedule based on products of Sherwin Williams.
- B. Paints: Ready-Mixed field catalyzed coatings. Pigments fully ground maintain a soft paste consistency, capable to readily and uniformly disperse to a complete homogeneous mixture.
- C. Paints to have good flowing and brushing properties and be capable of dry or curing free of streaks or sags.

2.03 COLORS

- A. Colors of paints and stains shall be as selected by the Owner.

2.04 MIXING AND TINTING

- A. Deliver all paints ready-mixed to the job site.
- B. Accomplish job mixing and job tinting only when acceptable to the Architect.
- C. Mix only in mixing pails in suitable sized non-ferrous or oxide resistant metal pans.

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- D. Use tinting colors recommended by manufacturer for the specific type of finish.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Thoroughly examine surfaces scheduled to be painted or stained prior to commencement of work. Report in writing to Architect any condition that may potentially affect proper application. Do not commence until such defects have been corrected. Initiation of painting and staining work indicates acceptance of substrate condition.
- B. Correct defects and deficiencies in surfaces which may adversely affect work of this section.

3.02 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply finishes unless moisture contents of surfaces are below the following maximums:
1. Plaster and gypsum wallboards: 12 percent.
 2. Masonry, concrete and concrete block: 12 percent.
 3. Interior Located Wood: 15 percent.
- B. Ensure surface temperature or the surrounding air temperature is above 40 degrees F. before applying finishes. Minimum application temperatures for latex paints for interior work is 45 degrees F. and 50 degrees F. for exterior work. Minimum application temperature for varnish finishes is 65 degrees F.
- C. Provide adequate continuous ventilation and sufficient heating facilities to maintain temperatures above 45 degrees F. for 24 hours before, during and 48 hours after application of finishes.
- D. Provide minimum 25 foot candles of lighting on surfaces to be finished.
- E. Comply with Manufacturer's recommendations as to environmental conditions under which coatings and coating systems can be applied.
- F. Do not apply finish in areas where dust is being generated.
- G. Allow asphaltic paving to cure 14 days minimum before applying traffic stripes.

3.03 PROTECTION

- A. Adequately protect other surfaces from paint and damage. Repair damage as a result of inadequate or unsuitable protection.
- B. Furnish sufficient drop cloths, shields, and protective equipment to prevent spray or droppings from fouling surfaces not being painted and in particular, surfaces within storage and preparation area.

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- C. Place cotton waste, cloth, and material which may constitute a fire hazard in closed metal containers and remove daily from site.
- D. Remove electrical plates, surface hardware, fittings and fastenings, prior to painting operations. These items are to be carefully stored, cleaned and replaced on completion of work in each area. Do not use solvents to clean hardware that may remove permanent lacquer finish.
- E. Painting is not required on any of the following unless specifically called for elsewhere in contract documents.
 - 1. Acoustical materials.
 - 2. Stainless steel, copper or anodized aluminum.
 - 3. Aluminum window/door frames and aluminum doors.
 - 4. Pre-finished wood doors
 - 5. Metal roof panels, flashing, and gutters/downspouts.
 - 6. Concealed pipes, ductwork and equipment.
 - 7. Factory finished doors and frames.
 - 8. Factory finished shelves, cabinets and similar material.

3.04 PREPARATION

- A. Woodwork
 - 1. Back-prime any new exterior woodwork.
 - 2. Wipe off dust and grit from miscellaneous wood items and millwork prior to priming. Spot coat knots, pitch streaks, and sappy sections with sealer. Scrape and sand wood surfaces to insure uniform appearance. Clean Woodwork.
 - 3. Nail holes must be puttied after prime or undercoat, then sanded smooth. Putty or wood filler must match color of finish where clear coat is specified.
 - 4. Where paint finish is specified for new interior wood, prime entire surface with a penetrating undercoat.
 - 5. Check moisture content with a moisture meter before initiating priming/painting work.
- B. Ferrous Metal
 - 1. Remove all rust and mill scale from surfaces requiring exposed finish coat of paint.

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2. Prior to blast cleaning, contamination shall be removed from steel surfaces. Remove oil and grease by solvent cleaning.
3. Prepare ferrous metal surfaces in strict accordance with rust-inhibitive primer manufacturer's instructions.
4. Wash unprimed galvanized metal with a solution of chemical phosphoric metal etch and allow to completely dry.
5. Sand and scrape shop primed steel surfaces to remove loose primer and rust. Feather out edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.

C. Galvanized Metals

1. Galvanized steel surfaces requiring painting must be solvent cleaned to remove all traces of grease or oil before priming as per specification.
2. Etching type primer required.

D. New Gypsum Board

1. New gypsum board must be free of sanding dust and joint treatment cement must be thoroughly dry.
2. Steel corner beadings should be primed with appropriate metal primer before applying latex coatings.

E. Concrete Masonry Units

1. At concrete masonry units, remove mortar and other foreign matter.
2. Fill large voids, caulk joints and cracks. Repair mortar as required.
3. Blow dust off materials with compressed air.
4. Check moisture content with a moisture meter before initiating prime/paint work.

3.05 SCAFFOLDS, LADDERS AND PROTECTION

- A. Contractor must furnish all required ladders, stages, scaffolds, etc. and they must be in safe condition, having adequate strength to support maximum work load, and complying with all current OSHA regulations.
- B. Scaffolds, ladders, etc. must not be left where they would interfere with other workmen, when not in daily use.
- C. Contractor must not only protect his work, but also that of other trades.
- D. Contractor is responsible for removal of all paint or coating splatter, spills, etc. on floors or adjacent colors, material, glass, hardware and other finished surfaces.

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- E. Contractor must leave premises clean and free from all rubbish and accumulated material left from his work.

3.06 APPLICATION

- A. Do not apply initial coating (primer) until moisture content of surfaces are within limitations recommended by paint manufacturer.
- B. Apply primer and paint with suitable brushes or rollers.
 - 1. Rate of Application shall not exceed that as recommended by paint manufacturer for the surface involved less 10% allowance for loss.
 - 2. Keep brushes, rollers, and spraying equipment clean, dry, free from contaminates and suitable for finish required.
 - 3. Apply primer and paint by brush or roller.
- C. Comply with recommendations of product manufacturer for drying time between coats.
- D. Sand and dust between each coat to remove defects visible from a distance of six feet.
- E. Finish coats shall be smooth, free of brush marks, streaks, laps or pile-up of paints, and skipped or missed areas.
- F. Finished metal surfaces shall be free of skips, voids, or pinholes.
- G. Leave all parts of molding and ornaments clean and true to details with no undue amount of paint in corners and depressions.
- H. Make edges of paint adjoining other material or colors clean and sharp with no overlapping.
- I. Refinish whole wall, if necessary, where portion of finish has been damaged or is not acceptable.
- J. Back-prime any new exterior woodwork with house paint primer prior to installation. Runs on face not permitted.
- K. Spot painting to correct soiled or damaged paint surfaces will be allowed only when touch up is blended into surrounding finish and is invisible to normal viewing. Otherwise, re-coat entire section to corners or visible stopping point.
- L. **Prime top and bottom edges of wood and metal doors with enamel undercoat when they are to be painted.**
- M. **Prime top and bottom edges of wood and metal doors with gloss varnish when they are to receive a stain or clear finish.**
- N. When paint, stain or coating is roller applied, proper skill must be used to avoid all signs of lapping and excess paint lines from edge of roller. When cutting in with a brush is

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required, these areas must be of the same texture, color and hiding as adjacent areas, to assure good appearance.

- O. All metal surfaces scheduled to be painted shall be washed with mineral spirits to remove dirt, oil or grease prior to painting.
- P. Approximately 25% of walls will require accent colors in saturated color. These walls may require an additional coat of paint for coverage.
- Q. Refer to Interior Elevations for paint striping, lettering, and logos.**

3.07 CLEANING

- A. Touch up and restore finish where damaged.
- B. Remove spilled, splashed or splattered paint from all surfaces.
- C. Leave storage area clean. Remove from site any and all empty paint containers and debris from painting operation.

3.08 MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Refer to mechanical and electrical sections with respect to painting and finishing requirements.
- B. Remove grilles, covers and access panels for mechanical and electrical systems from location and paint separately.
- C. Finish paint primed equipment to color selected.
- D. Where exposed, prime and paint insulated and bare pipes, conduits, boxes, insulated and bare duct, hangers, brackets, collars and supports, except where items are plated or covered with a pre-finished coating.
- E. Replace identification markings on mechanical or electrical equipment when painted over or splattered.
- F. Paint both sides of plywood backboards for electrical equipment before installing backboards and mounting equipment on them.

3.09 PRIME/PAINT SCHEDULE

Note: Schedule is written on Sherwin Williams Products. All finishing requirements (except traffic stripes) are based on and shall be a three (3) coat system.

- A. Exterior Surfaces:
 - 1. Ferrous Metal (Iron and Steel):

1 coat Kem Bond HS Universal Primer
or

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1 coat DTM Acrylic Primer/Finnish

2 coats A-100 Exterior Latex Flat/Satin or Gloss

2. Galvanized Iron:

1 coat Galvite HS @ 3.0 – 4.5 mils dft/ct

2 coats DTM Acrylic Coating @ 2.5 – 4.0 mils dft/ct
or

2 coats Metalatex Semi-Gloss Enamel

3. Metal Doors, Windows and Frames:

1 coat Kem Kromik Universal Metal Primer

2 coats Industrial Semi-Gloss Enamel

4. Traffic Stripes:

2 coats yellow or white traffic paint

2 coats H.C. blue at H.C. areas

5. Gypsum Board Soffits:

1 coat A-100 Exterior Latex Primer

2 coats A-100 Exterior Latex Flat

6. Concrete & Cement Plaster:

1 coat MasterProtect P 150 Primer

2 coats MasterProtect HB 400

B. Interior Surfaces:

1. Gypsum Board & Plaster (Ceilings, Eggshell Finish):

1 coat PrepRite Classic Interior Latex Primer

2 coats ProMar 200 Interior latex Eggshell Wall Paint

2. Gypsum Board (Epoxy):

1 coat PrepRite 200 Interior Latex Primer

2 coats Water Based Catalyzed Epoxy

3. Gypsum Board (Semi-Gloss):

1 coat PrepRite 200 High Build Interior Latex Primer/Surfacer B28W601

2 coats ProMar 200 Interior Latex Semi-Gloss Paint

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4. Concrete Block (Eggshell):

2 coats minimum of ProMar Interior Exterior Block Filler as required to fill surface with a solid coat of filler which penetrates holes, surface imperfections, etc. and seals the surface prior to application of paint. The Architect shall approve the block filler application prior to application of the paint finish.

2 coats ProMar 200 Interior Latex Eggshell

5. Concrete Block (Epoxy):

2 coats minimum of ProMar Interior Exterior Block Filler as required to fill surface with a solid coat of filler which penetrates holes, surface imperfections, etc. and seals the surface prior to application of paint. The Architect shall approve the block filler application prior to application of the paint finish.

2 coats Water Based Catalyzed Epoxy or 2 coats Sher-Tile HS Epoxy

6. Woodwork (Painted):

1 coat PrepRite Classic Interior Latex Primer

2 coats ProClassic Waterborne Acrylic Finish
or

2 coats Promar 200 Interior Latex or Alkyd Enamels

7. Metal Doors, Windows, and Frames:

1 coat Kem Kromik Universal Metal Primer

2 coats Alkyd Semi-Gloss Enamel

C. Refer to Interior Elevations for paint and patterns. Refer to A6.1 for additional information.

3.10 PAINT COLORS

A. Pre-selected paint colors:

1. P-1: SW76244 Naval (Walls, Door and Frame)
2. P-2: SW9170 Acier (Walls, Door and Frame)
3. P-3: SWCUSTOM SJ Red (Accent Stripe, Door Frame)
4. P-4: SWCUSTOM Lily White (Accent Stripe, Wall)
5. P-5: SW7757 High Reflective White (Accent Stripe, Ceiling)

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END OF SECTION

SECTION 10 11 16

MARKER BOARDS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide and install marker boards in areas designated and shown on drawings.

1.02 SUBMITTALS

- A. Submit a digital copy of manufacturer's descriptive literature and shop drawings for Architect's review.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Shall be equal to those as manufactured by CLARIDGE, Harrison, Arkansas, telephone: 870-743-2200.

2.02 MARKER BOARDS

- A. LCS white porcelain enamel writing surface, with markers and eraser. 24 gauge porcelain enamel steel skin.
- B. Series 1 aluminum frame with No. 502A head trim with tack strip (cork), continuous marker tray, and 2" clip angle hangers at 2'-0" o.c.
- C. Size: 4'-0" H x 8'-0" W as shown on drawings.
- D. Anchor bolts.
- E. Provide two (2) map hooks per board.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Provide solid blocking at top and bottom of unit. Secure to wall at top and bottom utilizing manufacturer's standard mounting details and hardware.

END OF SECTION

SECTION 10 11 23

TACK BOARDS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide and install tack boards in areas designated and shown on drawings.

1.02 SUBMITTALS

- A. Submit a digital copy of manufacturer's descriptive literature and shop drawings for Architect's review.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Shall be equal to those as manufactured by CLARIDGE, Harrison, Arkansas, telephone: 870-743-2200.

2.02 TACKBOARDS

- A. Tackboard equal to Fabricork, 1380, color as selected by Architect.
- B. Series 1 aluminum frame with No. 502A head trim with tack strip (cork) and 2" clip angle hangers at 2'-0" o.c.
- C. Provide two (2) map hooks per board.
- D. Size: 4'-0" H x 4'-0" W.
- E. Anchor bolts.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Provide solid blocking at top and bottom of unit. Secure to wall at top and bottom utilizing manufacturer's standard mounting details and hardware.

END OF SECTION

SECTION 10430
EXTERIOR SIGNAGE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Exterior signage: letters

1.02 SUBMITTALS

- A. Submit manufacturer's product data for Architect's review and approval and four (4) copies of shop drawings.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Pack letters individually in a manner to protect letters and their finish.

1.04 PROTECTION

- A. Protect adjacent or adjoining finished surfaces and work from damages during installation of the work.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Equal to letters as manufactured by Leeds Aluminum Letters, Leeds, Alabama. Phone: 205-699-5271.

2.02 LASER CUT ALUMINUM LETTERS

- A. Laser cut aluminum letters with screen color, coated.
- B. 3/8" thick.
- C. Polished and coated.
- D. Concealed mounting.
- E. Digital file for Screen color will be provided for production.
- F. Refer to drawings for size, and preselected colors.

2.03 LASER CUT ALUMINUM PATE LOGO

- A. Laser cut aluminum logo with screen color, coated.
- B. 3/8" thick

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- C. Polished and coated
- D. Concealed mounting.
- E. Digital file for Screen color will be provided for production.
- F. Refer to drawings for size, and preselected colors

PART 3 - EXECUTION

3.01 PREPARATION

- A. Provide solid backing for mounting letters.
- B. Before starting work, notify Architect of any conflicts detrimental to installation of signage.

3.02 INSTALLATION

- A. Install signage with attachment hardware as provided by signage manufacturer and in strict accordance with manufacturer's instructions.
- B. Install signage plumb and level, securely anchored to wall.

END OF SECTION

SECTION 10 14 13
INTERIOR SIGNAGE

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Engraved name and number plates at all spaces as scheduled on Door Schedule.

1.02 REFERENCES

- A. ADA – Americans with Disabilities Act, Accessibility Guidelines.

1.03 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions. Color to be selected by Owner and Architect. Submit schedule of signage to Architect for approval by Owner.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. See Touch Graphics, Inc., RP 100.
- B. Mohawk Sign Systems, 200A-Type D.
- C. ASI Sign Systems, Intouch.
- D. Supersine, Acrylic.
- E. Or approved equal.

2.02 COMPONENTS

- A. Minimum Size:
 - 1. Type 1: 6" x 8" (without changeable message, ADA).
 - 2. Type 2: 6" x 8" (without changeable message, standard).
 - 3. Type 3: 6" x 8" (with changeable message, standard).
 - 4. Type 4: 8" x 4" (without changeable message).
- B. Character Proportions: Letters and numbers on signs shall have a width-to-height ratio between 3:5 and 1:1 and a stroke width-to-height ratio between 1:5 and 1:10.
- C. Finish and Contrast: Characters and symbols shall have a non-glare finish. Characters shall contrast with their background with either light characters on a dark background or dark characters on a light background. Material: Plastic laminate or acrylic.

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- D. Raised and Brailled Characters and Pictorial Symbol Signs: Letters and numbers on signs shall be raised 1/32" (0.8mm) minimum, upper case, Sans Serif type characters, and shall be accompanied with Grade 2 Braille. Raised characters or symbols shall be at least 5/8" (16mm) high, but no higher than 2" (50mm). Pictograms shall be accompanied by the equivalent verbal description placed directly below the pictogram. The border dimension of the pictogram field shall be 6" (152mm) minimum in height. Characters and Braille shall not be located in the pictogram field.
- E. Symbols of Accessibility: Facilities and elements required to be identified as accessible shall use the international symbols of accessibility.
- F. Changeable Signage: Provide changeable message capability as scheduled.
- G. Braille: All Braille located on interior signage shall be contracted (Grade 2).
 - 1. Braille dots shall have a domed or rounded shape.
 - 2. Braille shall be positioned below the corresponding text. If text is multi-lined, Braille shall be placed below the entire text. Braille shall be separated 3/8" (9.5mm) minimum from any other tactile character and 3/8" (9.5mm) minimum from raised borders and decorative elements.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Mounting Location and Height: Interior signage shall be installed on the wall adjacent to the latch side of the door; where there is no wall space to the latch side of the door, including double leaf doors, signs shall be placed on the nearest adjacent wall. Mounting height shall be 60" above the finish floor to the center line of the sign and located 9" from the door jamb frame to the center line of the sign. Mounting location for such signage shall be so that a person may approach within 3" of signage without encountering protruding objects or standing within the swing of the door.
- B. **Do not mount signage directly to doors or frames.**
- C. Mount with double-faced foam tape and clear silicone.

3.02 SIGNAGE SCHEDULE

- A. Minimal Signage Required:
 - 1. At restrooms: ADA symbol and appropriate gender symbol (or symbols for unisex restrooms).
 - 2. At exit stairs: A tactile sign stating "EXIT" and complying with ICC/ANSI A117.1.
 - 3. At designated exit passageways and exit discharges: A tactile sign stating "EXIT" and complying with ICC/ANSI A117.1.

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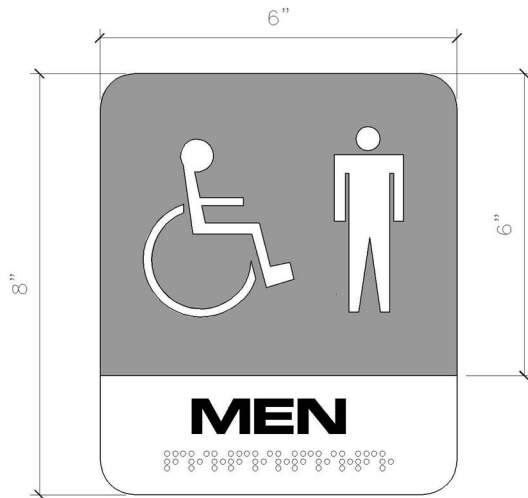
4. Any additional signage required by the Americans with Disabilities Act or local building codes.

B. Refer to Door Schedule for complete signage requirements.

PART 4 - FIGURES

4.01 SIGNAGE TYPE

- A. Type 1: 6" x 8" (without changeable message, ADA)



- B. Type 2: 6" x 8" (without changeable message, standard)

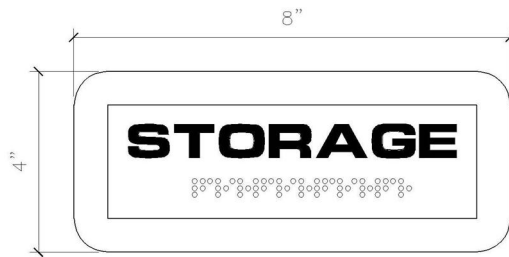


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- C. Type 3: 6" x 8" (with changeable message, standard)



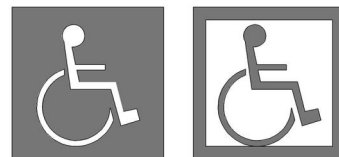
- D. Type 4: 8" x 4" (without changeable message)



4.02 INTERNATIONAL SYMBOLS FOR ACCESSIBILITY



Proportions (A)



Display Conditions (B)

END OF SECTION

SECTION 10 14 16

PLAQUES

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide and install project identification plaque.

1.02 SHOP DRAWINGS

- A. Provide shop drawings for Architect's and Owner's approval.
- B. Provide finish samples for Architect's and Owner's approval.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Leeds
- B. Matthews
- C. Southwell Co.
- D. Or equal.

2.02 CONSTRUCTION

- A. Material: Cast bronze.
- B. Size: 24" W x 36" H.
- C. Letter Style: Times Roman.
- D. Border Style: Single line.
- E. Background Texture: Leatherette.
- F. Mounting: Rosettes (verify surface to be mounted on)
- G. Background Color: Natural sandblast bronze.

2.03 CONTENT

- A. Sign shall contain:
 - 1. Name of Project.
 - 2. Name of Owner.
 - 3. Name of Superintendent.

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4. Names of Board Members.
5. Year the Construction was completed.
6. Name of Project Architect.
7. Name of Contractor.

2.04 PLAQUES IN PUBLIC BUILDINGS

- A. Plaques in public buildings paid for with public funds shall acknowledge the contribution of taxpayers.
- B. Include the following text on plaques in public buildings:
 1. This building was paid for by the taxpayers of Jones County.

PART 3 - EXECUTION

- A. Install where directed by Architect/Owner.

END OF SECTION

SECTION 10 21 13

SOLID PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish labor and materials as required for new urinal screens.
- B. Furnish labor and materials as required for new toilet partitions.

1.02 SUBMITTALS

- A. Submit shop drawings and product data.
- B. Clearly indicate partition layouts, swing of doors, elevations, anchorage and mounting details, panel construction, components hardware, finishes and all relevant dimensions.
- C. Submit manufacturer's descriptive literature and installation instructions.
- D. Provide sample colors for Owners selection. Black has selected.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Equal to Metpar, Polly, floor-to-ceiling mounting, Type FP/FP. Matpar Corp., 95 State Street, P.O. Box 1873, Westbury, New York, 11590.

2.02 MATERIALS

- A. Panels, doors, pilasters and screens shall be fabricated from HDPE polymer resins under high pressure forming a single component section.
- B. Partitions and doors shall be 1 inch thick with all edges machined to a radius of .250 inch and all sharp corners removed. All doors shall have aluminum edging strips fastened to the bottoms with stainless steel fasteners.
- C. Hardware:
 - 1. Hinges shall be full door length continuous aluminum hinge system. Pilaster is to be manufactured to accept door and hinge mechanism.
 - 2. Door closures are to be factory-set to accommodate all conditions and allow for a positive opening and closing action free of impediment.
 - 3. Each handicapped door to include: two (2) door pulls and one (1) wall stop.
 - 4. Door strike and keeper shall be fabricated from heavy aluminum extrusion (6364-T5 Alloy) with clear anodized finish with wraparound flange surface-

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mounted and thru-bolted to pilaster with one-way sex bolts. Size of strike shall be 6" in length.

5. Door latch housing shall be fabricated from heavy aluminum extrusion (6464-T5 Alloy) with clear anodized finish, surface-mounted and thru-bolted to door with one-way sex bolts. Slide bolt and button shall be heavy duty aluminum with anodized finish.
 6. Solid color plastic pilasters shall be anchored to finished floor and ceiling with stainless steel angles. Pilaster mounting shall be concealed with stainless steel shoes.
 7. Full-length wall brackets shall be continuous heavy-duty aluminum extrusion (6364-T5 Alloy). Brackets shall be used for all panels-to-pilaster, pilasters-to-wall, and panel-to-wall connections. Wall brackets shall be thru-bolted to panels and pilasters with one-way sex bolts. Attachment of brackets to adjacent wall construction shall be accomplished by 1-1/2" #14 stainless steel Phillips screws anchored directly behind the vertical edge of panels and pilasters at 13" intervals along the full length of bracket and at each 13" interval alternately spaced between anchor connections. Maximum privacy is required.
- D. The headrail shall be heavy duty aluminum extrusion (6364-T5 Alloy) with bright-dipped anodized finish in anti-grip configuration. Headrail shall be fastened to tops of pilasters and headrail brackets by thru-bolting with one-way stainless steel sex bolts.
- E. Urinal screens shall have floor to headrail pilaster typical for rigidity.
- F. Headrail brackets shall be 18-gauge stainless steel.
- G. Door pulls and coat hooks shall be supplied as required. Minimum one per compartment.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Examine site conditions to which work is to be applied. Take site dimensions affecting this work.
- B. Ensure correct spacing to coordinate with existing conditions.
- C. Ensure correct location of built-up framing, anchorage, blocking, and bracing where required.

3.02 INSTALLATION

- A. Installation shall be in strict accordance with manufacturer's written instructions.

END OF SECTION

SECTION 10 28 13
TOILET ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Restroom accessories and attachment hardware in all restrooms.
- B. Related Sections
 - 1. Section 06 10 00 – Rough Carpentry

1.02 SUBMITTALS

- A. Submit manufacturer's product data for any substitutions for Architect's review.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver accessories to site until rooms in which they are to be installed are ready to receive them.
- B. Pack accessories individually in a manner to protect accessory and its finish.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Bradley
(For description purposes, model numbers included for restroom accessories are items manufactured by Bradley)
- B. Bobrick
- C. ASI Group

2.02 PRODUCTS

- A. Grab bar:
 - 1. 36" ADA-compliant grab bar equal to Bradley series 812, 18 ga. 304 stainless steel tubing, 1 ½" diameter, safety grip finish, concealed mounting. One required at each handicap accessible toilet. Mount 34" above finished floor.
 - 2. 42" ADA-compliant grab bar equal to Bradley series 812, 18 ga. 304 stainless steel tubing, 1 ½" diameter, safety grip finish, concealed mounting. One required at each handicap accessible toilet. Mount 34" above finished floor.

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- 3. 18" ANSI-compliant grab bar equal to Bradley series 812, 18 ga. 304 stainless steel tubing, 1 ½" diameter, safety grip finish, concealed mounting. One required at each handicap accessible toilet. Mount 40" above finished floor vertically.
- B. Double roll surface mounted tissue dispenser, Model 5234.
- C. Paper towel dispenser, C-fold, Model 250-15.
- D. Soap Dispenser, Model 6562.
- E. Mop and broom holder, Model 9954.
- F. Mirrors, 24" wide by 36" high, Model 780-2436.
- G. 24 inch towel bar, Model 908.24. Two required at each shower.
- H. Shower rod with curtain, 1-1/4" Model 9539, with heavy gauge antibacterial curtain and rings, Model 9537. Length as required for shower.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Provide solid blocking as required for mounting accessories.
- B. Before starting work, notify Architect of any conflicts detrimental to installation or operation of accessories.

3.02 INSTALLATION

- A. Install accessories with attachment hardware as provided by accessory manufacturer and in strict accordance with manufacturer's instructions.
- B. Install accessories plumb and level, securely anchored to substrate.

3.03 PROTECTION

- A. Protect adjacent or adjoining finished surfaces and work from damages during installation of the work.

END OF SECTION

SECTION 10 44 16
FIRE EXTINGUISHERS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Furnish and install one (1) fire extinguisher and cabinet at each exit and as shown on drawings.
2. Furnish, install and maintain construction phase fire extinguishers throughout the construction of the project; comply with applicable codes and jurisdictional requirements.

1.02 SUBMITTALS

- A. Submit manufacturer's operation and maintenance data.
- B. Include test, refill or recharge schedules, procedures, and re-certification requirements.

1.03 QUALITY ASSURANCE

- A. Conform to NFPA – 10, requirements for portable fire extinguishers.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Potter-Roemer, Inc.
- B. J.L. Industries.
- C. Larsen's.
- D. Or equal.

2.02 FIRE EXTINGUISHERS

- A. General Purpose for Light and Ordinary Hazard locations:
 1. 10 pound
 2. Type 2A-80B:C U/L Rating
 3. equal to Larsen's MP10.

2.03 FIRE EXTINGUISHER CABINETS

- A. General Requirements:

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1. Aluminum construction
 2. Semi-recessed mounted
 3. Rolled radius frame
 4. Full view panel with text denoting fire extinguisher
 5. Size cabinets appropriately for the extinguisher housed
 6. Cabinets shall comply with ADA requirements and protrude no more than 4 inches from the wall
- B. Break-front cabinets:
1. Tempered safety glass.
 2. Keyed steel cam lock able to withstand 25 lbs. of pull pressure applied at the edge of the door opposite the hinge.
 3. Cabinet shall include a handle with the words, "In Case of Fire, Break Glass," inscribed upon it. Action of the handle shall break the safety glass and provide access to the fire extinguisher.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Do not install extinguishers when ambient temperatures may cause freezing.
- B. Verify cabinets are correctly sized and located.
- C. Beginning of installation indicates acceptance of existing conditions.

3.02 INSTALLATION

- A. Install cabinets plumb and level, 48 inches from finished floor to cabinet handle or as shown on Drawings.
- B. Secure rigidly in place in accordance with manufacturer's instructions.

END OF SECTION

SECTION 10 57 23
CLOSET AND UTILITY SHELVING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Utility Shelving.
- B. Related Sections
 - 1. Section 06 10 00 – Rough Carpentry
 - 2. Section 06 20 00 – Finish Carpentry

1.02 SUBMITTALS

- A. Furnish samples of plastic laminate to Owner for color selection.

1.03 QUALITY ASSURANCE

- A. Fabricate utility shelving in accordance with recommendations of Quality Standards of Architectural Woodwork (AWI).

1.04 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver utility shelving until site conditions are adequate to receive the work. Protect items from weather while in transit.
- B. Store utility shelving items indoors, in ventilated areas with a constant, minimum temperature of 60 degrees Fahrenheit, maximum relative humidity of 25 to 55 percent.

1.05 JOB CONDITIONS

- A. Contractor must examine the substrates and supporting structure and the conditions under which the work is to be installed, and notify the Architect of conditions detrimental to the work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer and the Architect. Initiation of installation indicates acceptance of substrate and existing conditions.

1.06 COORDINATION

- A. Take special care to furnish and install solid wood blocking at steel stud partitions for secure mounting of all shelving brackets.

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PART 2 - PRODUCTS

2.01 UTILITY SHELVING

- A. Shelves shall be 3/4" thick low pressure laminate equal to Melamine on industrial grade particleboard with PVC edges.
- B. Shelving standards shall be equal to Knappe & Vogt No. 80.
- C. Shelving brackets shall be equal to Knappe & Vogt No. 180. Chrome finish.
- D. Shelves shall be 16 inches deep unless noted otherwise.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Space brackets at 16 inches on center or as indicated on drawings.
- B. Construct members of continuous pieces of longest possible lengths.

END OF SECTION

SECTION 10815
PROTECTIVE PLUMBING INSULATION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide and install flexible vinyl insulation on plumbing traps, supplies and stops beneath all lavatories, sinks and countertops which are exposed and subject to contact.

1.02 SUBMITTALS

- A. Submit manufacturer's product data for Architect's review.

1.03 COMPLIANCE

- A. Satisfy ADA Article 4.19.4, and ANSI A117.1.

PART 2 - PRODUCTS

2.01 COMPONENTS

- A. Pre-manufactured flexible vinyl components to completely cover all exposed pipes, fittings and valves.

2.02 MANUFACTURERS

- A. Equal to "Handi Lav-Guard" by Truebro, Inc., or Brocar Products, Inc.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install components in strict accordance with manufacturer's written instructions.

END OF SECTION

SECTION 12 21 00

WINDOW BLINDS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Horizontal louver window blinds.

1.02 SUBMITTALS

- A. Submit manufacturer's descriptive literature and instructions for installation.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver and store manufactured products in original unopened packaging. Store materials shall be kept under cover in a dry place to prevent damage.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Bali, Levelor or approved equal.

2.02 MATERIALS

- A. One inch aluminum blinds (slat size: .984 inch)
- B. Slat Thickness: .008"
- C. Head Size: 1 inch by 1-1/2 inches wide
- D. Color as selected by Owner.
- E. Provide blinds in widths corresponding to vertical mullion spacing of windows. Where these smaller sections of blinds are ganged together, provide a continuous valance of longest possible width to cover heads.
- F. Provide continuous valance at all blinds.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install blinds in compliance with manufacturer's written instructions.
- B. Verify opening sizes on site.

END OF SECTION

SECTION 12 36 61.13
SOLID SURFACING COUNTERTOPS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Countertops
 - 2. Backsplashes
- B. Related sections:
 - 1. Section 06 20 00 – Finish carpentry
 - 2. Section 06 41 13 – Wood Veneer Faced Architectural Cabinets
 - 3. Division 22 – Plumbing

1.02 SUBMITTALS

- A. Shop drawings: Indicate dimensions, component sizes, fabrication details, attachment provisions and coordination requirements with adjacent work.
- B. Samples: Submit minimum 2" x 2" (50mm x 50mm) samples. Indicate full range of color and pattern variation. Approved samples will be retained as standards for work.
- C. Colors as selected by Owner.
- D. Product data: Indicate product description, fabrication information and compliance with specified performance requirements.
- E. Maintenance data: Submit manufacturer's care and maintenance data, including repair and cleaning instructions. Include in project close-out documents.

1.03 QUALITY ASSURANCE

- A. Allowable tolerances:
 - 1. Variation in component size: +/- 1/8" (3mm).
 - 2. Location of openings: +/- 1/8" (3mm) from indicated location.

1.04 DELIVERY, STORAGE AND HANDLING

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

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

1.05 WARRANTY

- A. Provide manufacturer's 10-year warranty against defects in materials. Warranty shall provide material and labor to repair or replace defective materials.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Corian (**BASIS OF DESIGN**)
- B. DuPont,
- C. or approved equal.

2.02 MATERIALS

- A. Material: Homogeneous filled acrylic; not coated, laminated or of composite construction; meeting ANSI Z124.3 & .6, Type Six, and Fed. Spec. WW-P-541E/GEN.
 - 1. Superficial damage to a depth of 0.010" (.25mm) shall be repairable by sanding and polishing.
 - 2. Solid Surface (SS-1):
 - a. Color: Cameo White

2.03 ACCESSORIES

- A. Joint adhesive: Manufacturer's standard two-part adhesive kit to create inconspicuous, nonporous joints, with a chemical bond.
- B. Panel Adhesive: Manufacturer's standard neoprene-based panel adhesive meeting ANSI A 136.1-1967 UL® listed.
- C. Sealant: Manufacturer's standard mildew-resistant, FDA/UL® recognized silicone sealant in color-matching or clear formulations.

2.04 FABRICATION

- A. For warranty coverage, fabricator/installer shall be approved by solid polymer manufacturer.
- B. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and solid polymer manufacturer requirements.
- C. Form joints between components using manufacturer's standard joint adhesive. Joints shall be inconspicuous in appearance and without voids. Attach 2" (50mm) wide reinforcing strip of solid polymer material under each joint.

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- 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.
- E. Finish: All surfaces shall have uniform finish.
 - 1. Matte, with a gloss rating of 5-20.
- F. Backsplashes: Form backsplashes using 1/2" solid polymer material. Fabricate in shop or field.
 - 1. Cove Backsplash: Fabricate 1/2" radius cove at intersection of counters and backsplashes.

PART 3 - EXECUTION

3.01 JOB MOCK-UP

- A. Prior to final approval of shop drawings, erect one full-size mock-up of each component at project site for Architect review.
- B. Should mock-up not be approved, rework or remake until approval is secured. Remove rejected units from project site.
- C. Approved mock-ups shall remain as part of finished work.

3.02 INSTALLATION

- A. Install components plumb and level, in accordance with approved shop drawings and product installation details.
- B. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work. Keep components and hands clean when making joints.
- C. Provide backsplashes and endsplashes. Adhere to countertops using manufacturer's standard color-matched silicone sealant.
- D. Keep components and hands clean during installation. Remove adhesives, sealants and other stains. Components shall be clean on Date of Substantial Completion.
- E. 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.

END OF SECTION

SECTION 13 34 19
METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish all labor, materials, and engineering services required to complete the roof, framing system, including anchor bolts, columns, beams, girts, bracing, mounting accessories, roof insulation, wall panels, metal trim, downspouts, gutters, insulation, and other components required for a complete job.
- B. General Metal Building Descriptions: Single story buildings, spans and bays defined on the drawings, eave heights defined on the drawings. Buildings subject to drift limitations.
- C. Anchor bolts, an anchor bolt setting plan, and anchor bolt templates shall be provided by the metal building system contractor. Anchor bolts lengths defined on drawings.
- D. The design shall limit drift at eave height to $H/180$.
- E. Metal building supplier shall design structural system with close attention to the detailing of the architectural and structural drawings.
- F. Where beam sizes are given on the structural drawings, that size beam shall be provided.

1.02 CODES AND STANDARDS

- A. The metal building shall meet or exceed the live load and wind load requirements of the International Building Code – 2018 edition
- B. Metal Building Design Loads:
 - 1. Dead Load: Self.
 - 2. Roof Live Load: 20 psf.
 - 3. Collateral Load: 10 psf.
 - 4. Wind Load: As stated on the drawings.
- C. The stamp of a registered engineer licensed in the State of Mississippi is required on all fabrication/erection drawings.
- D. Structural systems shall be designed to conform to the engineering standards of the American Institute of Steel Construction and the American Iron and Steel Industries. Manufacturer to be AISC-certified Category MB.

1.03 WARRANTIES

- A. Weathertightness: A manufacturer's representative shall inspect the installation of the roofing system and, upon approval, shall furnish a 20-year, no dollar limit (NDL) roofing

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system warranty for weathertightness. This warranty is to provide up to one (1) full replacement of the roof, including material and labor. The warranty shall include all roofing components consisting of, but not limited to, roof panels, anchoring devices, metal flashing, gutters, roof penetration flashing, roof curbs, plumbing vent flashing, and all other roof items furnished by or approved by the metal roof manufacturer.

- B. Twenty-year wall paint warranty as follows:
1. Will not chalk (gradual erosion of film) in excess of ASTM-D-659 Number 8 rating for a period of twenty (20) years from date of shipment as determined by procedures outlined in ASTM-D-659 Specification.
 2. Will not fade (color change of file) in excess of 5NBS units when measured in accordance with the standard procedure specified in ASTM-D-2244-94 for a period of twenty (20) years.
 3. Will not noticeably crack, check-blister, or peel for a period of twenty (20) years.
- C. The Contractor shall provide a written guarantee agreeing to maintain the roof free of leaks for a period of two (2) years starting at the time of acceptance of the project by the Owner.
- D. All warranties shall be in the name of the Contractual "Owner" as listed in the Owner-Contractor Agreement for this project. The Contractor (General or Sub) shall not be listed as the "Owner" on any warranties.

1.04 DRAWINGS AND CALCULATIONS

- A. Contractor shall provide erection information and drawings as required to describe and define system. Drawings shall include anchor bolt setting plan and piece marks or all major parts for easy field identification.
- B. Submit letter of design certification for the structural framing and covering panels of the metal building system. Letter of certification is to be signed and sealed by a registered professional engineer licensed in the State of Mississippi.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. CECO, Nucor, Butler, or equal.

2.02 PRIMARY MEMBERS

- A. Members fabricated from plate, plate coils, strip mill plate, or flat bar stock shall have flanges and webs joined on one side of the web by a continuous welding process. Minimum yield strength: 50,000 psi.
- B. Members fabricated from W shapes, conforming to physical specification of ASTM A-529. Minimum yield strength: 42,000 psi.

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- C. Primary frames may not exceed 24" depth up to 9'-0" A.F.F.
- D. Portal frames may not exceed 16" depth.

2.03 SECONDARY MEMBERS

- A. Purlins, girts, eave struts shall be cold formed from steel which has a minimum yield strength of 55,000 psi.
- B. Purlins shall be "Z" sections.
- C. Girts shall be "Z" sections or break formed "C" sections.
- D. Eave struts shall be "C" sections.

2.04 STRUCTURAL STEEL PRIMING

- A. Clean and prepare all steel members in accordance with the latest issue of SSPC (Society for Protective Coating) guidelines, as a minimum.
- B. Prime steel members:
 - 1. Minimum one mil thickness.
 - 2. Primer shall be equal to SSPC No. 15, Type 1, red oxide.

2.05 BRACING

- A. Transverse wind/seismic forces shall be transferred to the foundation through the use of portal bracing at walls in combination with "X" bracing in the plane of the roof.

2.06 STRUCTURAL BOLTS/NUTS

- A. ASTM A-325.

2.07 ROOF PANELS

- A. Standing seam panels of roll-formed 24 gauge steel seamed on site with a mechanical seamer.
- B. Panel Coverage: 24 inches.
- C. Major Ribs: Taper from 1 inch at top to 4-1/2 inch at base.
- D. Configurations: Interlocking standing legs at side laps which are field-seamed together in to a double fold, lock joint by use of a mechanical seamer, for a full Pittsburgh roll seam. Factory-applied sealant shall be provided in the overlapping standing seam leg.
- E. Fasteners: Concealed clips seamed into panel side laps. Screws for clips, self tapping, length as required.

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- F. Equal to CXP Panel by CECO. Kynar 500 finish over galvalume (or equal) substrate. Color as selected by Owner and Architect from standard colors.

2.08 WALL PANELS

- A. Roll-formed from 50,000 psi yield steel in 26 gauge.
- B. Panel Coverage: 36 inches.
- C. Ribs: 1-1/2 inch deep major ribs at 12 inch centers.
- D. Equal to MAP Panel by CECO. Kynar 500 finish over galvalume (or equal) substrate. Color as selected by Owner and Architect from standard colors.

2.09 FLASHING & TRIM

- A. Match wall panel material in finish, thickness, texture, and metal composition.
- B. Color as selected by Owner and Architect from standard colors.

2.10 GUTTERS AND DOWNSPOUTS

- A. Match wall panel material in finish, thickness, texture, and metal composition.
- B. Continuous gutter of manufacturer's standard profile as indicated on drawings. 6" width x 8" height standard.
- C. Downspouts as indicated on drawings; manufacturer's standard profile.
- D. 5-1/4" width x 3-11/16" depth standard.
- E. Color as selected by Owner and Architect from standard colors.

2.11 INSULATION

- A. Fiberglass blanket insulation, 3" fiberglass, laminated to 3.2 mil vinyl, UL flame spread of 25 or less.
- B. Fiberglass blanket insulation is required underneath all roof and wall panels.

2.12 ROOF PENETRATIONS

- A. Notify Architect prior to installation of any penetrations.
- B. Verify type and size of all roof penetrations with Divisions 15 and 16.
- C. All roof penetrations shall be made and installed by the metal building systems contractor.
- D. Round pipe, plumbing stacks, electrical conduits, and flue pipes shall be flashed with EPDM or Neoprene compression molded rubber with 1" wide corrosion-resistant flexible

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aluminum base. The base flange shall be incorporated with a pleated expansion joint. Set in sealant and use non-corrosive fasteners.

1. Metal building systems contractor shall coordinate with other trades and provide and install flashing for each condition encountered.
 2. Install flashing in flat portion of panels or through ribs with approval. Consult with Architect if penetration size exceeds spacing of ribs.
 3. Install so as not to block the flow of water.
 4. Review each proposed penetration detail with Architect prior to cutting roof.
 5. Flashing shall be equal to Deck-Mate by Portals Plus or Dektite.
- E. Curbs: Attic fans, exhaust fans, mechanical equipment shall be installed on pre-manufactured 24 gauge aluminum-zinc alloy curbs. Color and finish shall match roof panels.
1. Metal building systems manufacturer shall coordinate with other trades to determine each condition which will be encountered.
 2. Curbs shall be furnished by the trade which is providing and installing the equipment. Curb shall be installed by the metal building system contractor.
 3. Curbs shall be installed under the roof panels on the up-slope end and over the panels at the down-slope end.
 4. Provide additional sub-framing at areas receiving curbs. Install with triple bead tape sealer, sealant, and cinch straps.
 5. Review each proposed penetration detail with Architect prior to cutting roof.
 6. Curbs shall be equal to custom curbs or LM curbs.

2.13 SEALANTS

- A. Sealants for side laps, end laps, accessories, etc., shall be a preformed, butyl rubber-based compound. The material shall be non-hardening, non-shrinking, and non-corrosive and shall have excellent adhesion to metals, painted surfaces, and plastics to temperatures from -30 degrees F to 160 degrees F. These sealants shall be in tape mastic form, of shape and size recommended by manufacturer of metal building for various applications, and shall have paper backing for easy handling.
- B. Tube sealants shall be used to supplement tape mastic sealants and shall be applied in locations indicated by erection instructions. Tube sealant shall be a synthetic, elastomeric-based material which becomes tack-free in less than 2 hours at 75 degrees F but retains flexibility.

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PART 3 - EXECUTION

3.01 ERECTION

- A. Erection shall be in accordance with appropriate erection drawings and guides by metal building system manufacturer.
- B. It is the responsibility of the erector to comply with all appropriate legal and safety requirements. It is the responsibility of the erector to determine and provide any and all temporary bracing, shoring, blocking, bridging and/or securing of components.
- C. Take special care to coordinate the work of this section with the following work sections:
 - 1. Section 03300 – Cast-In-Place Concrete. Furnish and install anchor bolts, an anchor bolt setting plan, and anchor bolt templates for mounting of primary framing elements.
- D. Metal building system contractor shall remove from the site all trash and debris that results from the operations of this category of work.

END OF SECTION

SECTION 200010 - MECHANICAL GENERAL PROVISIONS

PART 1 GENERAL

1.1 SCOPE

Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.

1.2 MECHANICAL SPECIFICATION SECTION INDEX

Division 20 – Fire Protection, Plumbing and HVAC General Provisions

Section 200010 – Mechanical General Provisions
Section 200020 – Basic Mechanical Requirements
Section 200030 – Mechanical Submittals and Shop Drawings
Section 200035 – Mechanical Systems and Equipment Warranties
Section 200040 – Mechanical Close-out Requirements
Section 200050 – Basic Mechanical Materials and Methods
Section 200060 – Pipes and Pipe Fittings
Section 200100 – Valves
Section 200120 – Piping Specialties
Section 200140 – Supports and Anchors
Section 200170 – Electrical Requirements
Section 200190 – Mechanical Identification
Section 200240 – Mechanical Sound and Vibration Control
Section 200250 – Mechanical Insulation

Division 22 – Plumbing

Section 220430 – Plumbing Specialties
Section 220440 – Plumbing Fixtures, Trim and Accessories
Section 220450 – Domestic Water Heaters and Accessories

Division 23 – Heating, Ventilating and Air Conditioning (HVAC)

Section 230670 – Packaged Air Conditioners
Section 230756 – Packaged Heat Recovery Equipment
Section 230830 – Heating/Cooling Terminal Units
Section 230860 – Fans
Section 230885 – Air Cleaning/Treatment
Section 230890 – Ductwork
Section 230910 – Ductwork Accessories
Section 230980 – Controls and Instrumentation
Section 230990 – Testing, Adjusting and Balancing

1.3 DEFINITIONS

- A. ARCHITECT: Architectural Design firm or ARCHITECT OF RECORD, meaning general building designer whose professional seal appears on the majority of general construction Contract Documents, or their authorized representative.
- B. ENGINEER (ENGINEER-OF-RECORD): ENGINEER whose professional stamp appears on Contract Drawings, etc. In general, unless specifically denoted otherwise, ENGINEER-OF-RECORD in Division 20, 21, 22 and 23 Specification

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Sections denotes MECHANICAL ENGINEER-OF-RECORD.

- C. Exposed, or exposed to view: Those installations which can be seen, in whole or part.
- D. Finished Spaces: Inside the building extents.
- E. Inspect and/or Inspection: Utilized for the PROFESSIONAL'S construction period services and defines as "visits by the PROFESSIONAL to the Project at appropriate intervals during construction to become generally familiar with the progress and quality of the CONTRACTOR'S work and to determine if the work is proceeding in accordance with the Contract Documents."
- F. Outside: Synonymous with outdoors, outside of building, exposed to weather, etc.
- G. Plans: Denotes general Construction Drawings prepared by the A/E.
- H. PROFESSIONAL: Authorized representative of ENGINEER-OF-RECORD'S firm.
- I. Provide: Unless specifically denoted otherwise, the CONTRACTOR referred to shall be responsible for furnishing, providing, installing, connecting, and making item or system fully functional in a safe manner as recommended by the manufacturer and by Industry Standards.

1.4 APPLICABLE STANDARDS

- A. The intent is that the complete installation shall comply with applicable laws and ordinances, utility company regulations, and applicable requirements from the latest edition of the following:
 - ANSI American National Standard Institute
 - ASHRAE ASHRAE guides, Latest Editions
 - ASME American Society of Mechanical Engineers
 - ASTM American Society of Testing Materials
 - ICC International Code Congress
 - NFPA National Fire Protection Association
 - OSHA Occupational Safety and Health Administration
 - SMACNA Sheet Metal and Air Conditioning Contractors National Association
 - UL Underwriters Laboratories

City of Laurel, Mississippi, Fire, Building, Gas, Plumbing and Mechanical Codes and Regulations, and governing authority having jurisdiction.
- B. Other applicable building, safety or fire codes having jurisdiction over equipment, materials or methods. The decision of the ENGINEER will be final in event of dispute over Code to use or its interpretation.

1.5 GENERAL CONDITIONS

- A. The General Conditions, Information to Bidders, Special Conditions, and other pertinent documents issued by the ARCHITECT are a part of these Specifications and shall be complied with in every respect.

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- B. By the act of submitting a bid, this CONTRACTOR agrees that all of the Contract Documents and each of the divisions of the complete Specifications have been reviewed and studied, and all requirements and coordination resulting there from are included.
- C. This CONTRACTOR shall conform to standards prescribed by City, County, and State regulations or ordinances having jurisdiction. Any changes that may be necessary to conform to such regulations or ordinances shall be made by this CONTRACTOR without extra costs to the OWNER. Where code requirements are less than those shown on the Plans or in the Specifications, the Plans and Specifications shall be followed. Where applicable, NFPA requirements shall be met.
- D. The CONTRACTOR shall comply with all applicable provisions of the William-Steiger Occupational Safety and Health Act (O.S.H.A.).
- E. Permits required for the installation of the work, as well as all authorized code inspections, including all fees and assessments, shall be borne by and arranged for by the CONTRACTOR. The CONTRACTOR shall verify specific mechanical related provisions for permitting in advance, especially where additional design/installation documentation may be required, and include provisions and/or cost of same in this bid.
- F. This CONTRACTOR shall provide all items, articles, materials, operations or methods listed, mentioned, or scheduled on the Drawings and/or herein including all labor, materials, equipment and incidentals necessary, required or implied, for the completion of the various systems.

1.6 EXPLANATION AND PRECEDENCE OF DRAWINGS

- A. For purposes of clearness and legibility, Drawings are essentially diagrammatic and, although size and location of equipment are drawn to scale whenever possible, the CONTRACTOR shall make use of all data in the contract documents and shall verify this information at building site.
- B. Do not scale drawings having 1/4" or smaller scale. The Drawings indicate required size and points of termination of pipes and ducts, and suggest proper routes of pipe to conform to structure, avoid obstructions and preserve clearances. Because of small scale, it is not intended that Drawings indicate all necessary offsets, and it shall be the work of this Section to install work in such a manner as to conform to structure, avoid obstructions, preserve headroom and keep openings and passageways clear without further instruction or cost to the OWNER.
- C. It is intended that all apparatus be located symmetrically with architectural elements, and shall be installed at exact height and locations as shown on the Architectural Drawings.
- D. The CONTRACTOR shall be solely responsible for taking his own measurements and installing his work to suit conditions encountered.

1.7 SPECIAL CONDITIONS, MECHANICAL

- A. The right is reserved to move any element as much as ten (10') feet at no increase in cost provided CONTRACTOR is notified before work in question is fabricated or installed.

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- B. The CONTRACTOR shall fully inform himself regarding any and all peculiarities and limitations of spaces available for the installation of all work and materials furnished and installed under the contract. He shall exercise due and particular caution to determine that all parts of his work are made quickly and easily accessible. The CONTRACTOR shall be guided by the architectural details and conditions existing at the job, correlating this work with that of the other trades, and report to the OWNER any discrepancies or interferences that are discovered. Failure to report such discrepancies and interferences shall result in the correcting of these errors or omissions by the CONTRACTOR at his own expense. All work which deviates from the Drawings and Specifications without prior approval of the OWNER, shall be altered by the CONTRACTOR at his own expense to comply with the Drawings and Specifications as directed.
- C. If equipment or fixtures to be furnished by OWNER and/or OWNER'S vendor are not delivered prior to final acceptance, services shall be capped or plugged at walls or floor as directed by ARCHITECT, ready for future connection.
- D. The CONTRACTOR shall coordinate his work with that of the OWNER, in order that there will be no delay in the proper installation and completion of the work. If, in the opinion of the OWNER, any piping, equipment, etc., has been improperly placed or installed due to lack of coordination with the other trades, such piping and equipment shall be relocated as directed by the OWNER at the CONTRACTOR'S expense.

1.8 SITE SAFETY

CONSULTANT'S site responsibilities are limited solely to the activities of CONSULTANT and CONSULTANT'S employees on site. These responsibilities shall not be inferred by any party to mean that CONSULTANT has responsibility for site safety. Safety in, on, or about the site is the sole and exclusive responsibility of the CONTRACTOR alone. The CONTRACTOR'S methods of work performance, superintendence of the CONTRACTOR'S employees and sequencing of construction are also the sole and exclusive responsibilities of the CONTRACTOR alone. The CONTRACTOR shall, to the fullest extent permitted by law, waive any claim against CONSULTANT and his employees and indemnify, defend, and hold CONSULTANT harmless from any claim or liability for injury or loss arising from CONSULTANT'S alleged failure to exercise site safety responsibility. The CONTRACTOR also shall compensate CONSULTANT for any time spent or expenses incurred by CONSULTANT in defense of any such claim. Such compensation shall be based upon CONSULTANT'S prevailing fee schedule and expense reimbursement policy. The term "any claim" used in this provision means "any claim in contract, tort or statute alleging negligence, errors, omissions, strict liability, statutory liability, breach of contract, breach of warranty, negligent misrepresentation, or other acts giving rise to liability.

PART 2 – PRODUCTS – NOT APPLICABLE

PART 3 – EXECUTION

3.1 WORKMANSHIP, MATERIALS AND EQUIPMENT

- A. All work shall be performed in a workmanlike manner and shall present a neat and mechanical appearance when completed. All materials shall be of type, quality and minimum rating prescribed herein or indicated on the Contract Drawings.
- B. If equipment or fixtures to be furnished by OWNER and/or OWNER'S vendor are not

delivered prior to final acceptance, services shall be capped or plugged at walls or floor as directed by ARCHITECT, ready for future connection.

3.2 CLEAN-UP

- A. Do not allow mechanical related 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 parts of building, its finish or furnishings due to failure to properly clean or keep clean mechanical systems shall be repaired without additional cost to OWNER.
- D. All equipment, fixtures and installations, especially where installations are exposed to view, shall be thoroughly cleaned, polished, seams smoothed and/or sealed for a neat appearance.

3.3 INSPECTION OF PROPOSED CONSTRUCTION

Prior to submitting his bid, the CONTRACTOR shall visit the site of the proposed construction and shall thoroughly acquaint himself with existing utilities, working conditions to be encountered, etc. No additional compensation shall be allowed for conditions increasing the CONTRACTOR'S cost which were not known or appreciated by him when submitting his proposal if the condition was obvious and could have been discovered by him if he had visited the project site and thoroughly informed himself of all existing conditions which would affect his work, including requirements of local authorities to meet their procedures, special requirements, codes, etc.

3.4 TEMPORARY ENVIRONMENTAL CONDITIONING

Temporary heating, cooling and dehumidification capability shall be provided for this project beginning a minimum of 90 days prior to the original contract scheduled substantial completion date and maintained until the OWNER'S final acceptance of the project, or any phase thereof. The beginning of this temporary HVAC period is intended to align with general industry standard construction practice of providing a minimum suitable indoor environment for the installation and curing of adhesives, finishes, wall covering(s), tile ceiling/floors, etc. It is highly dependent upon the CONTRACTOR's comprehensive project coordination and scheduling efforts and shall be lengthened (begun earlier) should the CONTRACTOR install such systems and/or finishes which are recommended by the system and/or finish manufacturer to be installed and/or maintained in a minimum environmental condition. This interior space conditioning, known hereafter as "temporary HVAC", includes all areas of the project where the space will be similarly conditioned with heating, cooling and/or dehumidification capability after the project or any portion/phase thereof is completed.

During this minimal temporary HVAC period, the interior space shall be continuously monitored and controlled to provide the following:

- 1. maximum 85 degrees Fahrenheit dry bulb temperature.
- 2. minimum 60 degrees Fahrenheit dry bulb temperature.

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3. maximum 60% relative humidity.

In effect, automatic controls for refrigeration, dehumidification, and heating shall be provided such that the indoor building environment, as described above, can be continually maintained. If a system and/or finish manufacturer recommends a more stringent requirement for conditioning, same shall be provided.

The CONTRACTOR shall coordinate such temporary provisions with the all trades and utility companies to accomplish this requirement including adequate temporary power to equipment, etc. All cost and coordination for these temporary HVAC provisions shall be the responsibility of the CONTRACTOR and included in his base bid.

While operating the systems, the intent is to protect the installations from dirt, dust, debris, etc. such that at substantial completion the systems are new, clean and ready for the OWNER's beneficial use. The CONTRACTOR is responsible for protection of the WORK to meet the design intent identified herein. The following minimum requirements shall be met:

1. Completed manufacturer equipment start-up forms must be filled out completely for each and every piece of equipment. Copy of same shall be maintained on file at the project site for verification. Failure to complete the form entirely or maintain copy at project site will result in equipment operation being discontinued without exception.
2. The exterior building envelope is complete including installation of all permanent doors, windows, walls, louvers, roof openings, etc.
3. ALL interior and exterior dust generating activities and subsequent cleanup is complete and approved by the ARCHITECT. Examples of this are exterior sitework around the building, interior sheet rock installation/finishing, floor grinding, spray application of paints/sealers, etc.
4. HVAC Systems shall have pleated air filters of types indicated in Section Air Cleaning/Treatment installed, monitored and periodically replaced when loaded.
5. All R/A grilles and/or openings into ductwork/plenums are fully covered, and protected with filter material of types indicated in Section Air Cleaning/Treatment. These filters shall be continually monitored and periodically replaced when loaded.
6. There is no reduction in specified equipment warranty, capacity, performance, or life of the equipment.
7. HVAC equipment manufacturer's recommendations don't indicate construction practices and installations are harmful to systems, equipment, etc.
8. HVAC equipment manufacturer start-up tests have been performed and accompanying forms have been transmitted to Professional for review. See HVAC equipment specification sections for more information. A copy of same shall be included in Close-out Documents. See Section ***MECHANICAL CLOSE-OUT REQUIREMENTS***.

If new HVAC equipment cannot be utilized for providing indoor environmental control during construction for finishes, etc., the CONTRACTOR shall arrange for other temporary HVAC

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capacity as required.

If the CONTRACTOR fails to adhere to these guidelines for operation of the permanent building mechanical systems, corrective action by the CONTRACTOR will be required. Corrective action will be determined by the ENGINEER but may include any combination of the following:

1. Cleaning or Replacing Ductwork should it be found with visible dust/debris. A third-party testing/inspection representative may be required depending upon the extent of contamination.
2. Replacement or Cleaning of Equipment should it be found with visible dust/debris/damage. The respective equipment manufacturer's representative will be required to inspect and make written recommendations as to the corrective actions necessary to return the equipment to like new conditions.

The CONTRACTOR will be solely responsible for and include all cost associated with any required corrective actions.

However, permanent HVAC equipment, as described above, shall be fully operational during the last 30 days of the temporary HVAC period such that system performance and controls can be tested, adjusted and balanced per Section Testing, Adjusting and Balancing.

3.5 EXISTING UTILITIES AND SERVICES

- A. When encountered in work, protect existing active sewer, water, gas, electric, other utility services, structures; where required for proper execution of work, relocate them as directed. If existing active services are not indicated, contact PROFESSIONAL for instructions.
- B. When encountered in work area, whether or not indicated, cap or plug or otherwise discontinue existing inactive sewer, water, gas, electric, other utility service structures, of which action should be taken. If removal is required, request instructions from PROFESSIONAL.
- C. While work is in progress, except for designated short intervals during which connections are to be made, continuity of service shall be maintained to all existing utilities and systems. Interruptions shall be scheduled and coordinated with ARCHITECT and OWNER and approved in advance with the OWNER and serving utilities. If requested, downtime shall be limited to weekends and/or night periods to least disrupt normal use of these utilities. The CONTRACTOR shall be responsible for any interruptions to service and shall promptly repair any damages to existing systems caused by his operations.
- D. The accuracy of the location of existing underground, and otherwise concealed, HVAC, domestic, fire protection, sanitary and storm drainage utilities is not guaranteed. The CONTRACTOR shall, early in the project, prior to demolition of existing work and layout of new work, verify all underground and concealed work in the proximity of connections to existing services and routings.
- E. Immediately upon commencing construction, and prior to construction of any part of the facility involved in any way with utilities, the CONTRACTOR shall investigate thoroughly the size, capacity, arrangement and location of all mechanically related

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utilities. The CONTRACTOR shall immediately report any discrepancies or apparent problem involving the project that pertains to utilities. This applies to private as well as public utilities. This CONTRACTOR shall coordinate and utilize the services of public and private "locators" to ascertain the whereabouts of all underground utilities in the area where work is to be performed.

END OF SECTION

SECTION 200020 - BASIC MECHANICAL REQUIREMENTS

PART 1 – GENERAL

1.1 SCOPE

Furnish all labor, materials, services, and equipment required to complete the installation of complete and acceptable mechanical systems in accordance with these specifications and the contract drawings.

1.2 TESTS

- A. This CONTRACTOR shall conduct such tests as required to determine that systems and equipment, which he installs, conform to Specifications. CONTRACTOR shall supply all labor, materials, instruments, operations, etc., required to facilitate testing.
- B. Gauges, thermostats, and instruments used in testing shall be accurate, recently calibrated and approved by the PROFESSIONAL prior to test. Instruments installed permanently in systems as specified herein may be used in testing when approved by the ENGINEER.

PART 2 – PRODUCTS – NOT APPLICABLE

PART 3 – EXECUTION

3.1 MISCELLANEOUS WORK REQUIRED

- A. The CONTRACTOR shall provide foundations for equipment, chases, furring, framed openings in wall, partitions, etc., installation of wall louvers and grilles in doors, finish painting and all other similar work of a general construction nature. All roof flashing by CONTRACTOR.
- B. The CONTRACTOR shall bring adequate power to and make final connections to all equipment furnished under this Contract.
- C. All items of labor, materials and equipment not specifically stated herein or on Contract Drawings to be by others are required to make the systems complete and operative, shall be by this CONTRACTOR.

3.2 PROTECTION OF EQUIPMENT AND MATERIALS

- A. Responsibility for care and protection of equipment and materials under this Contract rests with this CONTRACTOR until equipment or materials have been tested and accepted.
- B. All pipe ends, valves, ductwork and parts of equipment left unconnected, permanently or temporary, shall be capped, plugged or properly protected at the end of each working day to prevent entry of foreign matter. During the construction process, cover ductwork exposed to weather and/or when not yet installed, with sheet metal caps screwed in place and sealed.
- C. Store equipment, ductwork including pipe and valves, off the ground and under cover. For storage outdoors, minimum 6-mil thick plastic shall be fitted to withstand splattering, ground water, precipitation and wind.
- D. Protect air handling unit coils by use of protective sheet metal panels or plywood.
- E. Damaged equipment shall be repaired or replaced at the option of the

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PROFESSIONAL. Finishes and/or scratched paint on equipment, etc., shall be repaired and repainted to match new condition(s).

- F. Do not bring insulated equipment or ductwork to job site until same can be adequately protected from wind, rain and damage, etc. In general, store ductwork in building(s) not yet fully enclosed, off the ground and under minimum 6-mil plastic sheeting, etc. This includes dual wall spiral and interior lined rectangular ductwork, and other similar equipment with liners, controls, etc., not recommended to be exposed to wind and water, etc. Such ductwork and equipment found damaged and/or damp shall be immediately replaced and shall not be utilized for this project.
- G. This CONTRACTOR shall protect his work at all times from danger by freezing, breakage, dirt, foreign materials, etc., and shall replace all work so damaged. The CONTRACTOR shall use every precaution to protect the work of others, and he will be held responsible for all damage to other work caused by his work or through the neglect of his workmen.

3.3 INSTALLATION COORDINATION

- A. The mechanical plans do not give exact elevations or locations of lines, nor do they show all the offsets, control lines, or other installation details. The CONTRACTOR shall carefully lay out his work at the site to conform to the structural conditions, to provide proper grading of lines, to avoid all obstructions, to conform to details of installation supplied by the manufacturers of the equipment to be installed, and to thereby provide an integrated, coordinated and satisfactory operating installation. In general ductwork has the right-of-way.
- B. If the CONTRACTOR proposes to install equipment, including piping and ductwork requiring space conditions other than those shown, or to rearrange the equipment, he shall assume full responsibility for the rearrangement of the space and shall have the ARCHITECT review the change before proceeding with the work. The request for such changes shall be accomplished by Shop Drawings of the space in question.
- C. The CONTRACTOR shall so coordinate the work of the several various trades that it may be installed in the most direct and workmanlike manner without hindering the other trades. Piping interferences shall be handled by giving precedence to pipe lines, which require a stated grade for proper operation. For example, sewer lines and condensate piping shall take precedence over water lines in determination of elevations. Where there is interference between sewer lines and condensate lines, the sewer lines shall have precedence and provisions shall be made in the condensate lines for looping them around the sewer lines. In all cases, lines requiring a stated grade for their proper operation shall have precedence over electrical conduit and ductwork.
- D. Piping, equipment, or ductwork shall not be installed in electrical equipment rooms or elevator machine rooms except as serving only those rooms. Outside of electrical equipment rooms, do not run piping or ductwork, or locate equipment, with respect to switchboards, panel boards, power panels, motor control centers or dry type transformers:
 - 1. Within 42" in front (and rear if free standing) of equipment; or
 - 2. Within 36" of sides of equipment.

3. Clearances apply vertically from floor to structure/ceiling.

3.4 INSTALLATION DIRECTIONS

Obtain manufacturer's printed installation directions to aid in properly executing work on equipment requiring such directions. Submit such directions and installation details to PROFESSIONAL for approval prior to time of installation for use in supervising work. If the manufacturer's installation instructions or details conflict with the Contract Document requirements, CONTRACTOR shall promptly make PROFESSIONAL aware in writing and request clarification.

3.5 MECHANICAL VERIFICATION AND INSPECTIONS

- A. The CONTRACTOR shall coordinate, with the A/E with a minimum ten (10) days advance notice, the inspection of mechanical sub-systems for the following:
 - 1. in-wall piping/ductwork
 - 2. above ceiling piping/ductwork
- B. These inspections shall be coordinated prior to wall and/or ceiling/attic insulation installation, (concealment) etc., such that these mechanical installations can be easily visually inspected by A/E for general conformance with Contract requirements. These installations shall not be concealed until such time the A/E indicates these mechanical installations are acceptable. If a re-inspection is required, an A/E revisit and a follow-up inspection shall be similarly coordinated with sufficient advance notice as approved by the A/E. Therefore, it is pertinent for the CONTRACTOR to inspect these type installations himself and verify that these installations are complete and in conformance with specified standards to minimize any time delays and/or coordination of construction sequencing, etc.
- C. The CONTRACTOR should note the following requirement for administering the punch list(s) and mechanical closeout documents associated with a substantial completion and/or final, etc.
- D. In general, the punch list(s) will be furnished with blanks for the CONTRACTOR and/or his Sub-Contractor(s) to initial and date, adjacent to each item, for coordination and verification efforts. The completed punch list shall be transmitted to A/E to allow them to thereafter schedule a follow-up visit for re-inspection and verification. It is, therefore, prudent for the CONTRACTOR, to administer the overall process, and verify that all punch list items are complete and in compliance with Contract requirements, prior to requesting a follow-up A/E inspection effort.
- E. The CONTRACTOR shall be liable for inspections and further administrative involvement required of the A/E after 30 days of the original scheduled completion date, and for re-inspections and involvement by the A/E caused by the CONTRACTOR'S negligence and failure to fully complete punch lists and Closeout Documents when required and/or requested.

END OF SECTION

SECTION 200030 - MECHANICAL SUBMITTALS AND SHOP DRAWINGS

PART 1 – GENERAL

1.1 SUBMITTALS AND SHOP DRAWINGS

- A. The submittal data to be furnished for this project shall comply with the Specifications and Contract Documents in their entirety. See *Division 01* for more information.
- B. Reproduction of design documents in any portion for use in a submittal is not acceptable.
- C. Provide all additional documentation required to obtain permanent permit for this project as may be required by Authorities Having Jurisdiction. All such additional documentation shall be considered a normal part of the shop drawing with the cost of same included.
- D. Selection of Materials and Equipment:
 - 1. Where a definite material or brand name is specified, it is not the intent to discriminate against any product of another manufacturer. Reference to a specific manufacturer's product by name, make or catalog number is intended to establish standards of quality, design, dimensions and appearance.
 - 2. Open competition is expected, but in all cases, complete data must be submitted for comparison and test when requested by the PROFESSIONAL. Burden of "proof of equality" lies solely with the CONTRACTOR.
 - 3. The products of various manufacturers have been used as the basis of design in preparation of these documents. It shall be the responsibility of the CONTRACTOR to ensure the submitted materials and equipment will fit into the space allotted. Furthermore, verify and maintain adequate access to equipment, valves, filters, lubrication outlets, etc. Any changes to the building or system design necessary shall be arranged for in writing before the materials and equipment is ordered. All costs involved in making such changes shall be borne by the CONTRACTOR.
 - 4. When submitting materials and equipment other than the basis of design, note the following minimum considerations:
 - a. Capacities shown are absolute minimum and must be equaled
 - b. Physical size, weight, etc. limitations
 - c. Noise and vibration levels
 - d. Interchangeability
 - e. Accessibility for maintenance and replacement
 - f. Compatibility with other materials, assemblies
 - g. Similar items shall be furnished by the same manufacturer and style whenever possible.

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5. The availability of service is of prime importance to the OWNER and was a major consideration in selecting the materials and equipment that are listed as the basis for design. Competent service must not only be available, but must, in the case of specialty HVAC equipment and control systems, be a direct arm of the manufacturer. Further, the service agency, as a representative of this manufacturer, must have been in continuous operation in this area sufficient time to indicate a degree of permanence.

1.2 SAMPLES AND MOCK-UPS OF PROPOSED INSTALLATION

A. Samples:

1. Provide samples of equipment, components, control devices, etc. as requested by the PROFESSIONAL.
2. These samples are intended to demonstrate quality of construction of proposed installation materials and/or equipment.
3. In general, each substitution request made by the CONTRACTOR will likely require a sample be furnished for review. However, in some cases, samples will be requested of specified equipment, components, control devices, etc. to demonstrate to the Owner the proposed installations.

B. Mock-ups:

1. Provide mock-ups of the proposed installations as requested by the PROFESSIONAL.
2. These mock-ups shall be either in-place or separately constructed at the direction of the PROFESSIONAL.
3. In general, mock-ups shall be of completed proposed installations as coordinated between CONTRACTOR and PROFESSIONAL. In some cases, this will require different levels of completion or staged mock-up construction (i.e. ductwork with taps installed and sealant applied in one section without insulation and insulation applied in another). Some examples of these mock-ups are as follows:
 - a. Pad-mounted packaged equipment
 - b. Ductwork including rectangular interior lined and exterior wrapped with round taps and run-outs
 - c. Plumbing fixture(s)
 - d. Trapeze piping installation including valves, fittings, insulation and saddles

PART 2 – PRODUCTS – NOT APPLICABLE

PART 3 – EXECUTION

3.1 SUBMITTALS AND SHOP DRAWINGS

- A. The following product data submittals for materials and equipment shall be submitted to PROFESSIONAL for approval:
 - 1. SECTION *PIPE AND PIPE FITTINGS*
 - a. Sanitary Waste and Vent Piping Fittings and Connections
 - b. Condensate Drain Piping Fittings and Connections
 - c. Domestic Water Piping Fittings and Connections
 - d. Refrigerant Piping Fittings and Connections
 - e. Equipment Utility and Relief Drain Piping Fittings and Connections
 - 2. SECTION *VALVES*
 - a. Manual "Circuit-Setter" Balancing Valves
 - b. Ball Valves
 - c. Check Valves
 - 3. SECTION *MECHANICAL IDENTIFICATION*
 - a. Piping Markers
 - b. Underground Tracer Identification Tape
 - 4. SECTION *MECHANICAL SOUND AND VIBRATION CONTROL*
 - a. Pipe, Duct and Equipment Vibration Isolation
 - 5. SECTION *MECHANICAL INSULATION*
 - a. Insulation for all piping applications
 - b. Insulation for all ductwork applications
 - c. Piping fitting insulation and cover
 - 6. SECTION *PLUMBING SPECIALTIES*
 - a. Cleanouts
 - b. Floor Drains
 - 7. SECTION *PLUMBING FIXTURES, TRIM & ACCESSORIES*
 - a. Plumbing Fixtures and Trim
 - b. Carriers
 - c. Handicapped Drain/Water Supply Insulation Protectors
 - d. Hose Bibbs
 - e. Water Hammer Arrestors
 - f. Ice maker Boxes

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8. SECTION *DOMESTIC WATER HEATERS AND ACCESSORIES*
 - a. Water Heaters and Installation Accessories
 - b. Potable Water Expansion Tanks
 - c. Re-circulating Pumps
9. SECTION *PACKAGED AIR CONDITIONERS*
 - a. Ductless Mini-Splits
10. SECTION *PACKAGED HEAT RECOVERY UNIT*
 - a. Energy Recovery units, equipment,
 - b. Components, Controls, etc., with Performance and Warranty Information.
11. SECTION *HEATING/COOLING TERMINAL UNITS*
 - a. Ceiling Heaters
12. SECTION *FANS*
 - a. All Fans, Construction, Accessories, and Finishes
13. SECTION *AIR CLEANING/TREATMENT*
 - a. Air Filters for Construction Period and Spares for Permanent use.
 - b. Bipolar Needlepoint Ionization Devices
14. SECTION *DUCTWORK*
 - a. Round to Rectangular Duct Adapters (Bell mouth)
 - b. Joint Sealant
 - c. Flexible Duct
 - d. Exposed Spiral Duct, Fittings and Shop Drawing Layout
 - e. Dual Wall Spiral Duct Insulation Liner Data
15. SECTION *DUCTWORK ACCESSORIES*
 - a. Duct Access Doors
 - b. Volume Dampers
 - c. Backdraft Dampers
 - d. Wall Louvers with Color/Finish Selection Chart and Screen Data
 - e. Air Distribution Devices
 - f. Brick Vents with Screen Data
16. SECTION *CONTROLS AND INSTRUMENTATION*
 - a. Control Devices
 - b. Override Timer

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- c. Relays
- d. Local Temperature Relay Panel & Labeling
- e. Wiring Diagrams and Shop Drawings
- f. Sequence of Operation
- g. Thermostat and Humidistat and Covers

17. SECTION *TESTING, ADJUSTING AND BALANCING*

- a. Testing, Adjusting and Balancing Agency, Certification Credentials, Sample Forms, Instrument List with Calibration History.
- b. TAB Report – Preliminary with certification of mechanical systems safety and operating controls. Note: Submittal must be transmitted to the Professional 5 days prior to request for substantial completion inspection.

END OF SECTION

SECTION 200035 - MECHANICAL SYSTEMS AND EQUIPMENT WARRANTIES

PART 1 – GENERAL

1.1 SCOPE

Furnish all labor, materials, services, and equipment warranties as outlined herein for mechanical systems and equipment.

1.2 GUARANTEE AND WARRANTY

- A. See Division 01 for warranty start date.
- B. INDUSTRY STANDARD GUARANTEE:
See Architectural Specifications.
- C. Test Period:
Each piece of equipment shall meet performance specifications after three months' actual operation to OWNER'S satisfaction.
- D. CONTRACTOR shall replace, or make good, any defect due to faulty workmanship or material, which shall develop within one year from the beginning of the warranty period. This guaranty shall cover both material and labor. Leaking pipe work is considered faulty workmanship. This warranty shall include repair, removal of defective parts and installation of replacements. The CONTRACTOR shall also be responsible for property damage that results from defects in materials, improper controls or setup, and/or installation during the warranty period.
- E. For first year after the warranty begins, CONTRACTOR shall provide, at no cost to the OWNER, any required maintenance and service necessary to assure the proper operation of the installations and systems. Latent defects arising during this period shall, upon notification by the OWNER, be promptly corrected at no additional cost to the OWNER. This shall include:
 - 1. Refrigerant and Oil Replacement in Refrigeration Systems: Leaking refrigerant systems shall be repaired, proved tight, and charged with manufacturer's recommended refrigerant and lubricant, within any standard warranty period.
 - 2. Any adjustments and service required, excluding filter monitoring and replacement.
 - 3. Any necessary adjustments in system control set points when required, excluding filter monitoring.
- F. The CONTRACTOR shall make inspections at end of 6th and 11th months after beginning of warranty related to the HVAC control system. During these inspections, the CONTRACTOR shall verify all control settings and recalibrate controls and sensors to match requirements as can be coordinated with PROFESSIONAL based on historical trend by data and to optimize system performance. Temperature and safety controls shall be adjusted as necessary to insure continuous, trouble free, safe, and automatic operation of systems including gas burner, refrigerating equipment, etc.

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G. Extended Equipment Warranties

1. Definitions and General Requirements

- a. Extended warranties, defined as a warranty after the standard one (1) year warranty.
- b. "Comprehensive" is defined as a complete warranty except for acts of God and negligent maintenance or operation of the specified equipment as required of the OWNER.
- c. All comprehensive equipment warranties shall include all parts, labor, shipping, postage, freight, handling fees, etc., to accomplish any repair and/or replacement at no additional cost to OWNER. These warranty provisions will be binding on any CONTRACTOR and/or supplier/manufacturer unless specifically approved otherwise in writing by OWNER.
- d. Lack of specific action on any manufacturer's, supplier, and/or CONTRACTOR submitted alternate warranty shall not be construed as approval of same and shall not void the manufacturer and/or CONTRACTOR'S contractual obligation to provide specified warranty.
- e. Third party insurance and/or split CONTRACTOR labor/manufacturer's equipment/material warranties shall not be acceptable. Only manufacturer's comprehensive warranties shall be acceptable.

2. Extended Warranties Required

- a. Section *Packaged Air Conditioners* – 4 years compressor parts only non-prorated.
- b. Section *Packaged Heat Recovery Equipment* – 4 years compressor parts only non-prorated.

PART 2 – PRODUCTS – NOT APPLICABLE

PART 3 – EXECUTION

3.1 GUARANTEE AND WARRANTY

All certificates shall first be presented to the ARCHITECT for approval. After approval, copies of the certification(s) shall be forwarded to the OWNER by the CONTRACTOR.

END OF SECTION

SECTION 200040 - MECHANICAL CLOSE-OUT REQUIREMENTS

PART 1 – GENERAL – NOT APPLICABLE

PART 2 – PRODUCTS – NOT APPLICABLE

PART 3 – EXECUTION

3.1 AS BUILT DRAWINGS

Project Record Documents and As Built Drawings:

- A. Maintain at job site a set of contract record documents kept current by indicating thereon all changes, substitutions, etc., between work as specified and as installed.
- B. Show on record documents actual air quantities, water flow rates, valve or damper positions after balancing, etc.; also show, by actual dimension, location of all new and known existing underground work.
- C. At the completion of the project, furnish the OWNER three (3) set(s) of bluelines and three (3) complete, clean sets of specifications showing installed location, size, etc., of all work and material as taken from record documents. All as-built (on record) drawings shall be labeled "As-Built Drawings," dated and certified accurate by CONTRACTOR with his signature, on front page of all Drawing Blueline sets and Specifications.

3.2 OPERATION AND MAINTENANCE MANUALS

- A. Submit three (3) complete sets of bound brochures in 8-1/2" x 11" spring post binders, indexed and tabled by equipment type (Mechanical Equipment, Plumbing Fixtures, etc.).
- B. Include in these brochures written submittal data, manufacturers operating and maintenance procedures and recommendations, spare parts lists and suppliers and any interlocking control or wiring diagrams for all equipment. The information listed herein is to be bound in the following order:
 - 1. First sheet to list ARCHITECT, ENGINEER, CONTRACTOR and Sub-Contractors with addresses for each.
 - 2. Second sheet to list type of equipment with sequential number, the manufacturer, make, model and serial number of the actual equipment nameplate data rated horsepower, full load rated amps, voltage and phase.
 - 3. Next, actual copy of approved submittal data including all manufacturers published information on capacities, capacity curves or tables, accessory and control item lists, and other pertinent information as requested by ENGINEER. Cross-reference all equipment to Contract Documents.
 - 4. Next, copy of all spare parts list and suppliers' contact information.
 - 5. Next, include the manufacturer's published operating and maintenance procedures.
 - a. Include instructions to stop and start each piece of equipment including reference to controls and interlocks and an itemized maintenance schedule detailing procedure and interval of periodic maintenance items. Start this log of the maintenance list(s) by

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accomplishing the initial required maintenance procedure(s) for each and every maintenance item.

- b. Operating instructions shall also include recommended periodic maintenance and seasonal changeover procedures, and suggested procedures in operation of all systems in this particular building to promote energy conservation. These instructions must be written expressly for this project and shall refer to equipment, valves, etc., by mark number from project schedules. Operating instructions and procedures shall be submitted in draft form, for approval prior to final issue of complete brochures. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instructions. Bulletins shall be clearly marked for the equipment furnished. Where a bulletin contains more information than that for the installed equipment, such extended information shall be deleted by crossing it out or by stripping it from the bulletin.
- 6. All system operating instructions that were earlier approved by PROFESSIONAL and utilized for OWNER personnel education shall also be inserted herein.
- C. This bound information will require the PROFESSIONAL'S signed approval before this contract is complete. No exceptions will be granted.
- D. A copy of HVAC and Plumbing equipment, and sprinkler system operation and maintenance (O & M) Manufacturer's recommended brochures shall be transmitted to the TAB Agent within ninety (90) days after Notice to Proceed such that TAB Agent shall utilize same in preparation of Owner's Personnel Education/Agenda.
- E. The manuals shall be previously approved by the PROFESSIONAL and transmitted to the OWNER at least one week prior to the final inspection.

3.3 OWNER EDUCATION

- A. OWNER Representative Education and Operating and Maintenance instructions
 - 1. During the last phase of the project, the CONTRACTOR, in conjunction with the applicable SUB-CONTRACTORS shall coordinate and facilitate the start-up, Testing, Adjusting and Balancing, and subsequent OWNER'S representatives' education and instruction.
 - 2. The OWNER education shall be administered by the CONTRACTOR, with special instructions from equipment technical representatives, CONTRACTOR qualified representatives, etc.
 - a. The instructions for the OWNER will include a complete walk-through of the facility, review of all mechanically related systems, and comprehensive education of the pertinent operating and maintenance requirements.
 - b. This shall include an overview of system components and descriptions, seasonal provisions/changes required, major valve location/function, safety provisions and concerns, normal operating and energy conservation techniques, actions to be taken with system failure or malfunction, start-up and shut-down instructions, reaction

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to fire and safety alarm annunciation, normal operating parameters, etc.

- c. The education shall include all pertinent data from industry standards, minimal recommendations indicated herein and further as recommended by each manufacturer's O&M manuals.
 - d. All equipment and material suppliers will also be expected to participate. The CONTRACTOR shall schedule with the A/E and designated OWNER'S Representative(s).
 - e. Additional instruction and education sessions shall be provided subsequent to the initial session to provide additional instruction as required to fully educate the OWNER'S operators.
- 3. The CONTRACTOR shall submit to the PROFESSIONAL in draft form, an outline of the contents of this education, with agenda and list of pertinent personnel, a minimum of thirty (30) days prior to project completion date and scheduling said instruction with the OWNER and PROFESSIONAL.
 - 4. When the seminar and subsequent instruction periods are completed, CONTRACTOR shall furnish ARCHITECT a letter signed by the OWNER certifying that his representative(s) has received adequate instruction in operation of installed equipment and systems. This letter shall be furnished prior to final acceptance of this project.
- B. Some suggestions for pertinent subject matter to include in the administration of the education of OWNER'S operation and maintenance personnel, is as follows:
- 1. Nominal Split and Packaged Direct Expansion Cooling and Heating Systems:
 - a. Air filter size, monitoring and changeout (note that CONTRACTOR is to provide a schedule to OWNER, indicating all systems, filter grilles, etc., and matched sizes) and number of air filters.
 - b. Periodic bearing lubrication
 - c. Periodic belt monitoring and adjustment
 - d. Periodic evaporator and condenser coil inspection and cleaning
 - e. Periodic monitoring of refrigerant charge by (1) visual observation of site glass, and (2) discharge air temperature monitoring
 - f. Normal temperature and fan controls setpoints for occupied and unoccupied periods.
 - g. Normal indoor humidity setpoints for all periods
 - h. Condensate drain periodic inspection and maintenance; including algaecide
 - i. Smoke detection and fire alarm interaction
 - 2. Potable Water Heaters and Accessories:
 - a. Normal setpoint and adjustment for water temperature from heater

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- b. Periodic maintenance for recirculating pumps
 - c. Function and periodic maintenance of T&P relief valve.
 - d. Function and periodic maintenance of anode rods.
3. Heat Recovery Direct Expansion Cooling & Heating Systems:
- a. Purpose for use during occupied periods (and unoccupied periods, where applicable)
 - b. Same items under nominal split and packaged direct expansion cooling and heating systems
 - c. Periodic monitoring and maintenance for heat recovery wheel and motor
 - d. OWNER'S instructions for setpoint control, monitoring and utilizing control panels & alarms, trend log and remote data acquisition capability
 - e. Warranties
4. Exhaust Fans:
- a. Periodic bearing lubrication
 - b. Periodic belt monitoring and adjustment
 - c. Periodic fan blade & grille inspection for excessive dust build-up, etc.
5. Ceiling Heaters:
- a. Describe purpose, temperature adjustment location & seasonal setpoint recommendation(s)
 - b. Periodic maintenance and cleaning, etc.
6. Controls:
- a. Describe setup and operation (including override functions) of programmable thermostats.
 - b. Calibration of sensors (temperature, humidity, etc.)
 - c. Describe purpose of duct smoke detection, HVAC unit shut-down, and remote smoke detector alarm panels and reset procedures.
7. General:
- a. Warranties: Explain the various warranties. Explain to OWNER his role during the warranty period(s), his limitations who he is to call when a problem tied to a warranty issue occurs, for both the one-year standard warranty and extended warranties, etc.
 - b. Special tools and spare parts
 - c. Air filter spares
 - d. Purpose of O & M Manuals (spare parts, O & M manufacturer's

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recommendations, trouble-shooting, etc.)

3.4 CLOSEOUT DOCUMENTATION

- A. Seven (7) days prior to requesting a final inspection, the CONTRACTOR shall submit all O&M and closeout documentation to the ARCHITECT, to be turned over to the OWNER at the end of the project.
- B. The following checklist shall be utilized for compiling documentation and shall be included behind front cover of O&M manuals.
- C. CONTRACTOR shall initial and date each line item once completed and shall fax or email copy of the completed checklist to the PROFESSIONAL prior to final inspection request.

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CLOSEOUT DOCUMENTATION CHECKLIST PLUMBING		
PROJECT NAME:		
INITIALS OF PERSON COMPLETING TASK	DATE TASK COMPLETED	DESCRIPTION OF CONTRACTOR'S SUBMITTAL
		Signed Letter Record of Owners Personnel O & M Education
		Plumbing Operation & Maintenance Manuals (3 each)
		As-Built Drawings with Contractor's Stamp (3 each)
		Potable Water Sanitation Report and Certification
		Pipe Test Log - Form in Section <i>Pipe and Pipe Fittings</i> to be comprehensively filled out.
		Keys to access doors per Section <i>Basic Mechanical Materials and Methods</i> (provide written receipts with Owner's acceptance).
		Keys to plumbing stops and hose bibb boxes per Section <i>Basic Mechanical Materials and Methods</i> and Section <i>Plumbing Fixtures, Trim and Accessories</i> (provide written receipts with Owner's acceptance).

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CLOSEOUT DOCUMENTATION CHECKLIST MECHANICAL		
PROJECT NAME:		
INITIALS OF PERSON COMPLETING TASK	DATE TASK COMPLETED	DESCRIPTION OF CONTRACTOR'S SUBMITTAL
		Final TAB Report (3 each required)
		Signed Letter Record of Owners Personnel O & M Education
		Mechanical HVAC Operation & Maintenance Manuals (3 ea)
		As-Built Drawings with Contractor's Stamp (3 each)
		Completed HVAC equipment factory start-up forms for each individual unit.
		Extended Warranties: (See Section <i>Mechanical Systems and Equipment Warranties</i>)
		Provide list of all spare air filter sets per Section <i>Air Cleaning/Treatment</i> . List number, size, type and location/equipment match-up.
		Pipe Test Log - Form in Section <i>Pipe and Pipe Fittings</i> to be comprehensively filled out.
		Duct Test Log - Form in Section <i>Ductwork</i> to be comprehensively filled out.
		Needlepoint Bipolar Ionization Log - Form in Section <i>Air Cleaning/Treatment</i> to be comprehensively filled out.
		Keys to access doors per Section <i>Basic Mechanical Materials and Methods</i> (provide written receipts with Owner's acceptance).
		Keys to control panels and sensor/controller covers per Section <i>Basic Mechanical Materials and Methods</i> and Section <i>Controls and Instrumentation</i> (provide written receipts with Owner's acceptance).

END OF SECTION

SECTION 200050 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 – GENERAL

1.1 SCOPE

- A. Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.
- B. The requirements of this section apply to all sections of Division 20, 21, 22 and 23.
- C. Definitions:
 - 1. Exposed: Piping, ductwork, and equipment exposed to view in finished rooms, including mechanical and/or equipment rooms.
 - 2. Option or Optional: CONTRACTOR'S choice of an alternate material or method.

1.2 PRODUCTS CRITERIA

- A. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
- B. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
- C. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or otherwise permanently marked on each item of equipment.

1.3 FLAME SPREAD AND SMOKE DEVELOPED PROPERTIES OF MATERIALS

- A. Materials and adhesives used throughout the mechanical and electrical systems for insulation, and jackets or coverings of any kind, or for piping or conduit system components, shall have a flame spread rating not over 25 without evidence of continued combustion and with a smoke developed rating not higher than 50. If such materials are to be applied with adhesives, they shall be tested as applied with such adhesives, or the adhesives used shall have a flame spread rating not over 25 and a smoke developed rating not higher than 50. (Note: Materials need not meet these requirements where they are entirely located outside of a building and do not penetrate a wall or roof, and do not create an exposure hazard.)
- B. "Flame-Spread Rating" and "Smoke Developed Rating" shall be as determined by the "Method of Test of Surface Burning Characteristics of Building materials," NFPA No. 255, ASTM E84, Underwriter's Laboratories, Inc., Standard". Such materials are listed in the Underwriters' Laboratories, Inc., "Building Materials List" under the heading "Hazard Classification (Fire)".

1.4 HAZARDOUS MATERIALS

- A. No products shall be used that contain any known hazardous or carcinogenic materials. Products with asbestos or radioactive content shall not be used.
- B. Handling of any hazardous material is not covered in this specification Division.

1.5 EQUIPMENT FURNISHED BY OWNER

- A. The CONTRACTOR shall unload, uncrate, assemble, and connect any and all

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equipment shown on the Drawings or called out in the Specifications to be furnished by the OWNER for installation by the CONTRACTOR.

- B. The CONTRACTOR shall protect and take full charge of such equipment from the time the items are delivered to the job, set in place, connected, tested, adjusted, and placed into operation.

PART 2 – PRODUCTS

2.1 EQUIPMENT ACCESSORIES

- A. Provide removable guards to enclose all rotating or moving elements. Construct of galvanized steel to withstand 250 lbs. static load.
- B. Wall/Ceiling Access Doors
 - 1. Panels in non-rated applications shall be galvanized steel, 18-gauge frame, 16-gauge door with mounting accessories, piano hinges, screwdriver operated lock, and prime coat paint.
 - a. Acudor Model UF-5000 for acoustic tile or exposed masonry
 - b. Acudor Model PS-5030 for plaster finishes
 - c. Acudor Model UF-5000 (stainless steel) for ceramic or glazed structural tile.
 - 2. Panels in fire rated applications shall be painted steel type, 1 hour rated, piano hinged, exterior key lock, nominal size 24" x 36" at equipment installations as approved, Air Balance, Inc. - Model "F".

2.2 ROOF CURBS

- A. Curbs shall be constructed as required to hold top level. See detail on Drawings for more information on curb construction requirements.
- B. Auxiliary supports under curbs shall be constructed as approved by ARCHITECT.

2.3 FIRE, SMOKE AND SOUND STOPPING

- A. UL listed penetration sleeve assembly and/or firestop that meets ASTM E-814 E119, and E84, as "3M" systems for the intended applications.
- B. All fire, smoke and sound stopping to be done by a separate licensed and certified Subcontractor as approved by Professional.

2.4 PIPE SLEEVES

- A. Galvanized sheet metal sleeves shall have lock seam joints and comply with the following minimum thickness:
 - 1. 24 Gauge for 3 inches and smaller.
 - 2. 22 Gauge for 4 inches to 6 inches inclusive.
 - 3. 20 Gauge for sizes over 6 inches.
- B. Galvanized steel sleeves shall be constructed from schedule 40 grade A53 pipe.
- C. PVC sleeves shall be constructed from solid core Schedule 40 PVC pipe.
- D. Water tight sleeves/seals shall be equal to "Link-Seal".

2.5 WALL, FLOOR, AND CEILING PLATES

- A. Chrome plated brass or chrome plated steel, one piece or split type with concealed hinge, with set screw for fastening to pipe, or sleeve.
- B. The thickness shall conform to the following requirements:
 - 1. Not less than 3/32 inch for floor plates.
 - 2. For wall and ceiling plates, not less than 0.025" for up to 3 inch pipe and 0.035" for larger pipe.
- C. All escutcheons shall be equal to Beacon, Caldwell or approved equal.

2.6 PROTECTIVE DRIP PANS

- A. Fabricate pans of 20-gauge galvanized sheet metal, stainless steel (if shown) or PVC, minimum two inches deep with rolled top edges.
- B. Solder all seams watertight, and cross brace pans to prevent sagging and warping.
- C. Provide dielectric union at copper pipe/galvanized pan connection point. Water heater drain pans shall have minimum one inch (1") drain outlet.

2.7 PAINTING OF MECHANICAL WORK

- A. See Division 09 for more information.

PART 3 – EXECUTION

3.1 EQUIPMENT ACCESSORIES

- A. Provide access panels, or doors, at concealed dampers, valves, vents, equipment, inspection points, etc., and where noted. Where ceiling is "lift out" construction, ceiling access panels are not required. Panels shall be 15" square, or larger as approved for service intended.
- B. CONTRACTOR shall provide substantial metal angle frame and support at all ceiling access doors.

3.2 ROOF CURBS

- A. All roof mounted equipment shall be furnished with a roof curb compatible with both the equipment configuration and roofing system. Curbs shall be installed level by either shimming or sloped curb construction. See detail on Drawings for more information on curb construction requirements.
- B. Provide auxiliary support under all roof mounted equipment under curb base and at all penetrations as approved by ARCHITECT.

3.3 FIRE, SMOKE AND SOUND STOPPING

- A. Fire and smoke stopping shall be provided and installed at all locations where mechanical Work passes thru rated assemblies. This includes all ductwork, piping and controls related conduit.
- B. Penetrations in "sound" walls shall be similarly acoustically sealed, both sides of wall with caulk or other approved material. New and existing walls extending to the roof/floor structure above are considered sound walls.

3.4 PIPE SLEEVES

- A. Pipe sleeves shall be constructed of galvanized sheet steel except where noted below or in individual work sections.
- B. Pipe sleeves shall be constructed of galvanized steel or schedule 40 PVC pipe when pipes are located within or passing through the following:
 - 1. concrete beams
 - 2. outside walls
 - 3. foundations
 - 4. footings
 - 5. waterproofed floors
 - 6. In locations where sleeve is extended above finished floor
- C. Where pipe motion due to expansion and contraction will occur, make sleeves of sufficient diameter to permit free movement of pipe.
- D. Where pipes are insulated, make sleeves of sufficient diameter to pass pipe insulations.
- E. Check floor and wall construction and finish to determine proper length of sleeves for various locations, make actual length to suit following:
 - 1. Terminate sleeve flush with walls, partitions, and ceilings.
 - 2. In areas where pipes are concealed as in chases, terminate sleeves flush with floor.
 - 3. In finished areas where pipes are exposed, extend sleeves 1/4" above finished floor except in kitchen, toilets, equipment rooms, and other areas where water may accumulate on floor, extend 1 1/2".
- F. Interior openings shall be caulked tight with fire, smoke or sound stopping material and sealant to prevent the spread of fire, smoke, and sound. Contractor shall coordinate specific requirements to ensure fire, smoke or sound ratings are maintained.
- G. For drilled penetrations in existing floors provide one-inch angle rings set in silicone sealant and bolted to the floor in lieu of pipe sleeves with one inch extension above floor.
- H. Below grade exterior wall penetrations into habitable spaces, including crawlspaces shall include sleeves with water tight seals as "Link-Seal".

3.5 WALL, FLOOR, AND CEILING PLATES

- A. Exposed piping passing through walls, floors and ceilings, shall be fitted with escutcheons.
- B. Inside diameter shall fit around insulation or around pipe when not insulated; outside diameter shall cover sleeve.
- C. Use plates that fit tight around insulation or pipes when not insulated.
- D. Plates shall cover openings around pipes/insulation and cover the entire pipe sleeve

projection.

3.6 PROTECTIVE DRIP PANS

- A. Provide pitched drip pans where shown under all fluid conducting piping that is over electric switchgear, elevator controllers, busways or electric motor starters or as indicated. Pans shall extend minimum two inches beyond each side of the mechanical equipment, pipe or group of pipes being contained. Pans shall extend six inches beyond electrical equipment below.
- B. Pitch pans shall be routed to a drain connection with discharge piped utilizing $\frac{3}{4}$ " or larger of copper tube to the nearest available open drain or outside as directed by PROFESSIONAL. Open-end slices discharging to intercepting pans are not acceptable.
- C. Provide drip/overflow pans under water heaters, air conditioning equipment, pumps, etc., and where shown.

3.7 PAINTING OF MECHANICAL WORK

- A. All equipment shall present a clean painted appearance; touch up or repair as required.
- B. All surfaces shall be properly prepared prior to painting. CONTRACTOR must contact PROFESSIONAL, such that all tests, installations etc., are approved prior to painting.
- C. The CONTRACTOR shall prime (where applicable) and paint the following mechanical related Work:
 - 1. Piping of the following types which are outdoors and indoors when exposed to view, including mechanical rooms:
 - a. Domestic Water Piping.
 - b. Sanitary Drain/Vent Piping.
 - 2. All exposed ferrous metal non-galvanized hangers, auxiliary supports, braces, etc., in all locations.
 - 3. All exposed and exterior galvanized ductwork, plenums, access doors, and control conduit, fitting, boxes, etc.
 - 4. All insulated refrigerant piping, pumps, valve bodies, etc., where exposed to view outdoors.
 - 5. All new or modified fire hydrants, metal valve and metal box covers, post indicator valves, gas meter/regulators, and the like. This includes items provided and installed by others, and existing on-site installations.

3.8 WELDING

Before any welding is performed submit a copy of the Welding Procedure Specification (WPS) together with the Procedure Qualification Record as required by Section IX of the ASME Boiler and Pressure Vessel Code for each and every welder intended for use on this project and with qualifications and certifications suitable for work classification intended.

- A. Before any welder performs any welding, submit a copy of the Manufacturer's

Record of Welder Operator Qualification Tests as required by Section IX of the ASME Boiler and Pressure Code. The letter or symbol (as shown on the qualification test form) shall be used to identify the work of that welder and shall be affixed, in accordance with appropriate construction code, to each completed weld. Submit certification according to Section *Mechanical Submittals and Shop Drawings* for each and every welder and welding associated with the project.

- B. The types and extent of non-destructive examinations required for pipe welds are shown in Table 146.4 of the Code of Pressure Piping ANSI/ASME B31.1.

3.9 TOOLS AND KEYS

- A. Furnish, and turn over to the OWNER, special tools not readily available commercially, that are required for disassembly or adjustment of equipment and machinery furnished.
- B. Provide OWNER, at end of project with spare keys to stops, hose bibbs, control cabinets, tamper-proof controls covers, etc. Provide the following spares, and label with function/locations:
 - 1. Plumbing Stops – 8 keys
 - 2. Hose Bibbs – 8 keys
 - 3. Control Panels – 4 keys each panel
 - 4. Tamper-proof Controls Cover – 2 keys per cover
 - 5. Wall and Ceiling Access Doors – 2 keys per door

3.10 LUBRICATION

- A. During construction, all bearings and shafts shall be kept thoroughly greased and protected.
- B. After equipment has been operated seven days and before final acceptance, all bearings shall be inspected and filled to operating level with lubricant recommended by manufacturer. Tag each piece of equipment with cloth tag showing: proper type of lubricant, and period between lubrications, date of lubrication, and worker's initials. Have space for ten (10) lubrication notations.

3.11 WORK IN AND AT EXISTING BUILDING AND/OR BUILDING SITES

- A. Perform as described or shown on Contract Drawings, for relocation of existing equipment, alterations and restoration of existing building(s).
- B. As specified on Contract Drawings, make alterations to existing service piping at times that will least interfere with normal operation of the facility.
- C. It is important that CONTRACTOR thoroughly investigate existing conditions, utilities, services, finishes, sized, connections, etc., prior to bidding this project. The Designer's responsibility included only a cursory review of existing conditions and/or installations. It is the CONTRACTOR'S responsibility to coordinate a more thorough investigation and ascertain and confirm pertinent installation connections, etc., prior to his bid. This investigation shall be coordinated in a minimum seven (7) days advance of any published bid date such that the CONTRACTOR immediately thereafter can advise Designer in writing of any design discrepancies and/or

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changes required; otherwise, the CONTRACTOR shall be required to remedy any such peculiarities at his own expense and at no additional cost to the OWNER. It is the CONTRACTOR'S responsibility to verify existing size and/or location, etc., any time replacement and/or modifications to existing are included as a part of this project.

- D. Prior to excavation, investigation shall be made to the extent necessary to determine the location of existing underground services, structures and conflicts. Care should be exercised by the CONTRACTOR during excavation to avoid damage to existing structures.
- E. The CONTRACTOR shall be responsible for obtaining the services of an "Independent Locator" whose function shall include location and identification of all underground service wiring, piping, coax, fiber optics, etc. The CONTRACTOR shall make every effort to protect and avoid conflicts with existing installations. Damage caused to existing installation by CONTRACTOR, or his Sub-contractor, etc., shall be promptly remedied and put back into service, per serving utility requirements.
- F. When obstructions that are not shown on the Contract Drawings are encountered during the progress of work and interfere so that an alteration of the Drawings is required, the ENGINEER will alter the Drawings or order a deviation in line and grade or arrange for removal, relocation, or reconstruction of the obstructions.
- G. When crossing existing pipelines or other structures, alignment and grade shall be adjusted as necessary, with the approval of the PROFESSIONAL, to provide clearance as required by federal, state or local regulations or as deemed necessary by the ENGINEER to prevent future damage or contamination of either structure.

3.12 PROTECTION AND CLEANING

- A. Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as approved by the PROFESSIONAL. Damaged or defective items, in the opinion of the PROFESSIONAL, shall be replaced.
- B. Protect all finished parts of equipment, such as shafts and bearings where accessible, from rust prior to operation by means of protective grease coating and wrapping. Close pipe openings with caps or plugs during installation. Tightly cover and protect fixtures and equipment against dirt, water chemical, or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.
- C. Do not store insulation materials in building until it is enclosed and dry. Wet insulation shall not be installed.
- D. Fixtures, piping, ducts, equipment, etc., shall be cleaned per manufacturer's printed instructions and PROFESSIONAL'S instructions.
- E. Piping shall be: (1) flushed with clean water, (2) "blown out" with steam or compressed air, or (3) "swabbed out" as required, except where specified otherwise. All temporary connections required for flushing shall be provided and subsequently removed by the CONTRACTOR. See Section *Pipe and Pipe Fittings* for further instructions.

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- F. Before final building interior finish is applied:
 - 1. Interior of air handling equipment shall be thoroughly cleaned.
 - 2. Drain pans shall be cleaned and then flushed with water after which all fans will run with air filters in place, etc., for 24 hours.

3.13 CUTTING AND PATCHING

- A. Do not cut into any major structural element without written approval of the ARCHITECT.
- B. Cut required openings through existing masonry or reinforced concrete with diamond core drills. Use of pneumatic hammer type drills, impact type electric drills, and hand or manual hammer type drills, will be permitted only with approval of the ARCHITECT. Locate openings that will least affect structural slabs, columns, ribs or beams. Refer to the ARCHITECT for determination of proper design for openings through structural sections and opening layouts for approval prior to cutting or drilling into structure. After ARCHITECT'S approval, carefully cut openings through construction no larger than absolutely necessary for the required installation.
- C. Patching shall be (1) of quality equal to, and of appearance matching existing construction, and (2) shall restore all services and construction that remains in use, to its condition prior to this contract, unless otherwise noted.

3.14 FLASHING

- A. Where pipes, ducts, etc., pass through roof or walls, flash and caulk.
- B. Provide flashing or caulking as required at each opening through outside walls or roof. Flashing through roof of same materials and methods as under Moisture Protection Division; through walls shall be aluminum unless noted otherwise.

END OF SECTION

SECTION 200060 - PIPES AND PIPE FITTINGS

PART 1 – GENERAL

1.1 SCOPE

- A. Provide all material, equipment and labor, etc., required to complete installation specified and/or shown or scheduled on Contract Drawings.
- B. Work included: Pipes, fittings, unions, couplings, flanges, gaskets, and other materials and instructions.

1.2 PIPING SCHEDULE

Piping systems for this project shall include the following:

- A. Sanitary Waste and Vent Piping.
- B. Condensate Drain Piping.
- C. Domestic Water Piping.
- D. Refrigerant Piping.
- E. Equipment Utility and Relief Drain Piping.

1.3 MANUFACTURER'S ASSISTANCE

Manufacturer shall provide, if required, to the CONTRACTOR a factory trained service man to properly train CONTRACTOR'S personnel in all phases of installation.

PART 2 – PRODUCTS

2.1 PIPING MATERIALS

All piping installed on this project shall be new and of full weight and size indicated and of proper specification for service intended. Only domestic pipe may be used. Pipe and pipe fittings for the various systems shall be as follows:

- A. Sanitary Waste and Vent Piping.
 - 1. Piping above and below slab on grade extending to five (5) feet outside building perimeter, shall be solid core Schedule 40 PVC with solvent weld joints and DWV fittings.
 - 2. Sanitary waste piping below grade outside building shall be as specified in *Civil Division*.
- B. Condensate Drain Piping.
 - 1. Condensate drain piping routed indoors shall be solid core Schedule 40 PVC with solvent weld joints and DWV fittings.
 - 2. Piping exposed outside of building shall be Schedule 40 galvanized steel with threaded joints and fittings, or Schedule 40 PVC with solvent weld joints and fittings, paying close attention to spacing of piping supports in Section *Supports and Anchors*.
- C. Domestic Water Piping.
 - 1. Piping above slab on grade inside building shall be Type "L" copper with 95/5 soldered joints or specialty piping systems such as "ProPress" by

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Viega. "T-drill" or "pulled" taps/outlets shall NOT be utilized; only full body fittings will be allowed.

2. Underground service entrance at building shall be single extended 90 degree fitting of fabricated 304 stainless steel, maximum working pressure of 200psi.
 - a. Sizes 2"-3" equal to Watts Series TR2. Provide with grooved or MNPT connections on inside of building. Provide with grooved, MNPT or flanged connections outside of building.

3. Piping routed outside building below grade, shall be as specified in Section *Civil Division*.

D. Refrigerant Piping

1. Piping shall be Type "L" ACR copper with brazed joints. All joints, fittings and piping shall be brazed connection type. No flared or compression piping accessories allowed except at equipment connections.

E. Equipment Utility and Relief Drain Piping

1. Indoor water heater T & P, backflow preventer and miscellaneous equipment relief and drain piping shall be full size connection Type 'L' copper with solder joints.
2. Piping exposed outside of building shall be Schedule 40 galvanized steel with threaded joints and fittings.

2.2 PIPE FITTINGS, UNIONS, FLANGES, AND GASKETS

- A. All fittings shall conform to pipe as to black steel, galvanized steel, copper, PVC or cast iron, etc. or as indicated. Fittings and accessories shall have equal or greater pressure rating than piping specified for particular application.
- B. Malleable steel fittings shall be minimum 150 psi class.
- C. Steel pipe unions shall be malleable iron having bronze to iron ground joints.
- D. Steel nipples shall be extra heavy type. All thread nipples prohibited. Provide a minimum of 1" of bare pipe between threaded ends of nipples.
- E. Flange bolts: Galvanized Alloy steel, ASTM #A 196, Galvanized GR. B 7; nuts' ASTM #S 194, GR. 2 H; both hex head style.
- F. Flange gaskets serving piping below 250 degrees F shall be synthetic composition type; serving above 250 degrees F gaskets shall be corrugated metallic type. Utilize gasket suitable for service intended.
- G. Couplings, steel pipe malleable iron, Grade II.
- H. Provide factory made reducers and increasers, and nipples of comparable materials as the piping. The use of bushings is not acceptable to obtain reduction or increase in sizes.
- I. Galvanized steel pipe shall be assembled with galvanized screw fittings unless specifically indicated otherwise.

2.3 DIELECTRIC FITTINGS

Provide where copper and ferrous metal are joined.

- A. 2-inch and less: Threaded dielectric union.
- B. 2 ½-inch and larger: Flange union with dielectric gasket and bolt sleeves.
- C. Temperature Rating, degree F: 210 for water systems.

2.4 BEDDING AND BACKFILL MATERIALS

- A. Type S1 – Select Fill
 - 1. Material shall consist of select, non-organic, debris-free silty clays or sandy clays with no more than 55 percent fines passing a No. 200 sieve.
 - 2. The plasticity index shall be within the range of 8 to 20.
 - 3. The liquid limit shall be less than 40.
- B. Type S2 – Course Aggregate
 - 1. Material shall consist of washed stone free of shale, clay, friable material, sand and debris.
 - 2. The aggregate shall be graded in accordance with ANSI/ASTM C33, size number 467.
- C. Type S3 – Pea Gravel
 - 1. Material shall consist of natural stone free of shale, clay, friable material, sand and debris.
 - 2. The material shall be graded to be between a minimum of 1/4" and a maximum of 5/8" in size.
- D. Type S4 – Sand
 - 1. Material shall consist of natural river or bank sand, washed free of silt, clay, or organic matter, loam friable or soluble materials.
 - 2. The material shall be graded in accordance with ANSI/ASTM C33.
- E. Type S5 – Crushed Stone
 - 1. Crushed limestone, No. 610 gradation.

2.5 BEDDING AND BACKFILLING MATERIAL QUALITY CONTROL

- A. Tests and analysis of soil material shall be performed in accordance with ASTM D4318 or ASTM C136.
- B. Materials tested which do not meet the specified requirements shall be removed and replaced with acceptable material at no cost to Owner.
- C. Maximum dry density of the soil materials shall be determined by ASTM D698 and field density of in-place materials by ASTM D2922.

PART 3 – EXECUTION

3.1 PIPING INSTALLATION

A. General

1. Arrange and install piping approximately as indicated, straight, plumb and as direct as possible; form right angles or parallel lines with building walls. Keep pipes close to walls, partitions, ceilings, offset only where necessary to follow walls as directed. Locate groups of pipes parallel to each other; space them at distance to permit applying full insulation and to permit access for servicing valves. The PROFESSIONAL reserves the right to require this CONTRACTOR to make minor changes in pipe locations where conflicts occur with other trades or equipment. Such changes shall be made without extra cost to OWNER.
2. Install horizontal piping as high as possible without sags or humps. Grade drainage piping at uniform slope of 1/8" per foot minimum and maximum 1/4" per foot, or as noted. Where this is impossible, maintain slope as directed, but in no case less than 1/16" per foot. Pitch piping in direction of flow.
3. When piping is cut, it shall be reamed with pipe reamer and all burrs, scale, trash and foreign matter removed. If any piping is found installed without being reamed, cleaned, deburred, etc., or in any way contrary to above, it shall be sufficient reason for related erected piping to be removed, inspected by the PROFESSIONAL, corrected and reinstalled, all at CONTRACTOR'S expense.
4. Where size changes on horizontal lines, use reducing fittings; bushings are prohibited. On liquid lines have eccentricity down, hold the top level. On gas or vapor lines have eccentricity up, hold the bottom level.
5. Sufficient space shall be allowed in erecting piping for proper application of thermal installations including fittings. In no case shall any insulation be cut or reduced thickness because of inadequate space.
6. Offset equipment connections to allow valving off for maintenance and repair with minimal removal of piping.
7. Locate valves for easy access and operation. Concealed valves shall be provided access doors. Do not locate any valves with stems below horizontal.
8. Install gauges, thermometers, valves and other devices with due regard for ease in reading or operating and maintaining said devices. Locate and position thermometers and gauges to be easily read by operator or staff standing on floor or walkway provided. Servicing shall not require dismantling adjacent equipment or pipe work.
9. Furnish and install unions or mating flanges at all connections to each piece of equipment conveniently located to facilitate quick and easy disconnecting of equipment. Flanges or union connections shall be used on both sides of traps, control valves, pressure reducing valves and meters and the like.

B. Steel Piping

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1. Where piping is threaded, dies shall be clean and sharp. Threads shall conform to ANSI B2.1; joint compound shall be applied to male threads only and joints made up so no more than three threads show. Coat exposed threads or steel pipe with joint compound and red lead paint for corrosion protection. The caulking of these joints will not be tolerated. Pipe joint compound must be approved by the PROFESSIONAL.
2. Where welding is specified or done, it shall be by electric arc by mechanics skilled in operation and holding a test certificate acceptable to the ENGINEER. All scale and flux shall be removed from piping after welding. Welding, beveling, spacing and other details shall conform to ANSI B31.1.

C. Plastic Piping

1. Install all fittings and joints as per manufacturer's recommendation.
2. Utilize purple pipe cleaning compound on all solvent weld joints.
3. Utilize manufacturer's recommended colored (non-purple) solvent glue on all solvent weld joints, unless manufacturer's installation instructions do not allow or if solvent glue is not rated for specific application.
4. Install all underground plastic and fiberglass glass piping outside building perimeter with tracer identification tape (per Section Mechanical Identification) and minimum 12-gauge bare copper wire for future location reference.

D. Copper Piping

1. Copper tubing shall be thoroughly reamed, cleaned with steel wool or emery cloth and a non-corrosive flux used before soldering or brazing.
2. Copper tubing shall be thoroughly reamed and de-burred before joining with specialty piping systems such as Viega "Pro-Press".
3. Where solder joints are specified, use solder having 95% tin and 5% antimony. Each roll of solder shall be clearly stamped as to grade and content.
4. Where brazing joints are specified, use a brazing filler metals having a melting point above 1100 degrees F and containing at least 5% silver.
5. Where copper tubing extends through concrete slab on grade, tubing shall have an "Armaflex" or "Rubatex" type.
6. Provide PVC isolation wrap where copper pipe extends through masonry walls to connect plumbing fixtures or valves, etc.

E. Refrigerant Piping

1. Braze joints in the presence of an inert gas.
2. Verify pipe size and configuration and provide same based on HVAC equipment manufacturer's recommendation to provide scheduled capacity, performance and maximize equipment life.
3. Refrigerant piping systems shall be installed in accordance with applicable chapters of the ASHRAE "Applications" handbook. Particular attention shall

be given to suction gas, velocities and requirements for liquid sub cooling.

3.2 PIPE EXPANSION

- A. In the installation of all pipe runs where shown or where necessary, install swing joints, flexible couplings, turns, expansion loop or long offsets to allow for expansion. Broken pipe or fittings due to rigid connections must be removed and replaced at no additional cost to the OWNER.
- B. All lines shall be securely anchored where required. Where such anchors occur, they shall be securely fastened to the steel or concrete structure of the building in a manner approved by the PROFESSIONAL. Drawings shall be submitted before installation.

3.3 ANCHORS

Plastic pipe shall be jointed to steel systems with flanges. Steel system shall be anchored within five (5') feet of connection point to eliminate any thrust, stress, or torque from steel system to fiberglass and/or plastic system.

3.4 THRUST BLOCKS

All changes in direction of fiberglass or plastic pressure systems for 2" and larger systems shall be encased in concrete (3000 psi) thrust blocks to provide anchor points for direct expansion and contraction.

3.5 TESTS

- A. Cooperation/Scheduling:

The ARCHITECT shall be notified no less than ninety-six (96) hours prior to any pipe test. The ARCHITECT shall also be notified in adequate time for an inspection of the test before the test is completed. The PRIME CONTRACTOR'S Superintendent shall be responsible for administering and witnessing all tests, log it for permanent record and transmit to ARCHITECT at completion of project. CONTRACTOR shall refer to and make additional copies of the "Pipe Test Log Form" at the end of this section to use as standard test log forms. The PRIME CONTRACTOR'S Superintendent shall keep this on-going log on jobsite and shall include the following:

 - 1. Date of Test
 - 2. Duct/Piping Description (EX: "Sanitary Sewer")
 - 3. Location (EX: "Northwest Quadrant First Level")
 - 4. Results (EX: "Held 10 ft. of head for eight hours without leakage", etc.)
- B. Tests shall be as follows: (New and Existing Modified Piping shall be tested and all leaks repaired)
 - 1. Gravity Flow Sanitary Waste and Vent piping above and below slab: Minimum 10 feet static head and as required by ASA A40.8 or local code, for a minimum period of four (4) hours, without discernable loss. All below grade piping and joints shall be clearly visible during test.
 - 2. Gravity Flow Condensate Drain piping above and below slab: Minimum 10 feet static head and as required by ASA A40.8 or local code, for a minimum

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period of four (4) hours, without discernable loss. All below grade piping and joints shall be clearly visible during test.

3. Water Piping: (Domestic and circulating systems) 125 psi hydrostatic or 100 psi air, in conjunction with manufacturer's recommendations, with no discernable pressure loss for a period of eight (8) hours. Potable water piping shall be pressurized with water or air during all phases of construction such that leaks can be promptly identified and remedied.
4. Refrigerant piping: 450 psig nitrogen for 8-hour period unless more stringent requirements are recommended by the equipment manufacturer. Test piping with all piping accessories such as charging valves and filter/driers in place, unless not recommended by equipment manufacturer's installation instructions. Refrigerant piping shall be left with minimum 60 psi pressure during all phases of construction such that leaks can be promptly identified and remedied.

3.6 SYSTEM CLEANING, TREATMENT AND PROTECTION

- A. Potable Water System: All new and modified existing potable water lines shall be thoroughly flushed and sterilized with a solution containing not less than 50 ppm available chlorine for eight (8) hours. During sterilization, operate all valves, faucets, etc., so that all portions of the system are reached. Flush system with clear water until concentration drops to 0.5 ppm. CONTRACTOR shall furnish sample to State Health Department attesting to satisfactory condition of water. Submit copy of test reports to ARCHITECT near end of project and prior to OWNER'S use of potable water distribution system.

3.7 BELOW GRADE PIPING INSTALLATION

- A. Preparation
 1. Prior to excavation, investigation shall be made to the extent necessary to determine the location of existing underground structures and conflicts. This CONTRACTOR shall coordinate and utilize the services of public and private "locators" to ascertain the whereabouts of all underground utilities in the area where work is to be performed.
 2. When obstructions that are not shown on the Contract Drawings are encountered during the progress of work and interfere so that an alteration of the Drawings is required, the PROFESSIONAL will alter the Drawings or order a deviation in line and grade or arrange for removal, relocation, or reconstruction of the obstructions.
 3. Appropriate traffic control devices shall be provided in accordance with federal, state, or local regulations to regulate, warn, and guide traffic at the work site.
 4. Trees, shrubs, fences, and all other property and surface structures shall be protected during construction unless their removal is shown on the Contract Drawings and Specifications or approved by the OWNER.
- B. Excavation
 1. During excavation, material meeting the Type S1 requirements shall be

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stock piled in an orderly manner and at a sufficient distance from the banks of the trench to avoid over-loading and to prevent slides or cave-ins. Submit test reports to verify soil properties.

2. All excavated materials not required or suitable for backfill shall be removed and disposed of off-site at CONTRACTOR's expense.
3. Excavation and trenching shall be performed to allow utilities to be installed to lines and grades established by the Contract Drawings and Specifications with fittings and valves at the required locations unless otherwise approved by the PROFESSIONAL.
4. All excavation of every description and of whatever substances encountered shall be performed to the depths indicated or as otherwise specified.
5. Excavated material shall be placed in a manner that will not obstruct sidewalks, driveways, or other structures.
6. Care should be exercised by the CONTRACTOR during excavation to avoid damage to existing structures and utilities.
7. When excavation of rock is encountered, all rock shall be removed to provide a clearance of at least 9 inches below and on each side of all pipe, valves, and fittings. The same shall also be performed when pieces of concrete or masonry and other debris or subterranean structures, such as masonry walls, piers, or foundations are encountered during excavation.
8. When crossing existing pipelines or other structures, alignment and grade shall be adjusted as necessary, with the approval of the PROFESSIONAL, to provide clearance as required by federal, state or local regulations or as deemed necessary by the PROFESSIONAL to prevent future damage or contamination of either structure.
9. Removal of pavement and road surfaces shall be a part of the trench excavation and the amount removed shall depend upon the width of trench required for the installation of structures. The dimensions of pavement removed shall not exceed the dimensions of the opening required for installation of pipe and other structures by more than 6 inches in any direction unless required or approved by the OWNER.
10. Should the trench pass over a sewer or other excavation, the trench bottom shall be sufficiently compacted to provide support equal to that of the native soil or conform to other regulatory requirements in a manner that will prevent damage to the existing installation.
11. Temporary support, adequate protection, and maintenance of all underground and surface structures, drains, sewers, and other obstructions encountered in the progress of the work shall be furnished by the CONTRACTOR. All properties that have been disturbed shall be restored as nearly as practical to their original condition.
12. When the sub grade is found to be unstable or to include ashes, cinders, refuse, organic material, or other unsuitable material, such material shall be removed, to a minimum of at least 12 inches below the pipe level and backfilled up to original trench depth with Type S1 material.

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13. Ditches shall be kept free of water during piping installation. Grading shall be done as necessary to prevent surface water from flowing into trenches or other excavations, and any water accumulating therein shall be removed by pumping or by other approved methods. Discharge from any trench dewatering pumps shall be conducted to natural drainage channels, storm sewers, or an approved reservoir.

C. Bedding and Backfilling

1. General Requirements:

- a. The trenches shall not be backfilled until the installation conforms to the requirements specified.
- b. Do not install backfill over porous, wet, frozen or spongy sub-grade surfaces.
- c. In areas where less than 16" of ground cover exists, the piping shall be encased in concrete. Concrete shall be minimum 3000 PSI with reinforcing as indicated or required. Backfill shall be provided above concrete to original grade or sub-grade.
- d. Pavement, base course, and compacted sub grade disturbed by trenching operations shall be replaced in an acceptable manner with materials equal to the adjacent compacted sub grade, base course, and pavement for a minimum distance of 12 inches on each side of the trench.
- e. If compaction tests indicate Work does not meet specified requirements, CONTRACTOR shall remove Work, replace and retest until specified requirements are met.

2. Bedding and Backfilling Requirements:

- a. Bedding shall be provided for all piping, valves, etc.
- b. Bedding material shall be either Type S3 or S4.
- c. Bedding shall extend from 4" below bottom of pipe to 12" above top of pipe.
- d. Backfill shall extend from 12" above top of pipe up to top of trench or original grade/sub-grade.

3. Placement and compaction of bedding and backfilling materials under roads, parking areas, etc. shall be performed as follows:

- a. Place materials in continuous 6" thick horizontally placed loose layers and compact to 98% ASTM D698 maximum density with stability (stability shall be the absence of significant pumping or yielding of the soils while compaction is being performed).
- b. Adjust moisture content of materials utilized for bedding and backfilling with lime or other Professional approved method of restoring stability as required to obtain specified compaction requirements.

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- c. Compaction tests shall be performed for each lift of bedding and/or backfilling per 200 linear foot of piping length.
- 4. Placement and compaction of bedding and backfilling materials under grassy areas, sidewalks, etc. shall be performed as follows:
 - a. Place materials in continuous 9" thick horizontally placed loose layers and compact to 95% ASTM D698 maximum density with stability (stability shall be the absence of significant pumping or yielding of the soils while compaction is being performed).
 - b. Adjust moisture content of materials utilized for bedding and backfilling with lime or other Professional approved method of restoring stability as required to obtain specified compaction requirements.
 - c. Compaction tests shall be performed for each lift of bedding and/or backfilling per 200 linear foot of piping length.

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PIPE TEST LOG						
DATE	SYSTEM	LOCATION OF TEST	TEST PRESSURE	LENGTH OF TEST	RESULTS	CONTRACTOR'S SUPERINTENDENT WITNESS INITIALS
						PRIME

Note: Turn in all forms filled out with project closeout documentation. Copy this form if more sheets are needed. These forms and/or log shall be kept at jobsite and upon request made available to ARCHITECT and/or PROFESSIONAL.

END OF SECTION

SECTION 200100 - VALVES

PART 1 – GENERAL

1.1 SCOPE

Provide all material, equipment and labor, etc., required to complete installation as specified herein and/or shown or scheduled on Contract Drawings.

1.2 APPLICABLE STANDARDS

Insofar as possible, all valves of the same type shall be of the same manufacturer.

1.3 VALVE DESCRIPTION AND IDENTIFICATION

- A. Valves shall have name or trademark of manufacturer and working pressure cast or stamped on valve body.
- B. Valve hand wheels shall be oriented when installed to provide maximum accessibility for operation.
- C. Valve discs shall be the manufacturer's standard material for the service in which the valve is used unless otherwise indicated under the individual type valve specification.

PART 2 PRODUCTS (OTHER VALVES FROM THOSE LISTED MAY BE SUBMITTED FOR APPROVAL)

2.1 VALVES FOR DOMESTIC WATER APPLICATIONS

- A. All valves shall be NSF 61 compliant and contain less than 0.25% lead (Pb) by weight.
- B. Ball Valves:
 - 1. Valves 2" and smaller shall be two-piece brass or stainless-steel construction, 1-1/4" extended neck, chrome plated ball with full port, P.T.F.E. seals and seats. Heavy duty steel handle with vinyl grip, quarter turn operation. Valves shall be suitable for working pressure of 200 psig and maximum 250deg F.
 - 2. Valves 2-1/2" and larger shall be same as above except that two or three-piece brass or stainless-steel construction may be utilized.
- C. Silent Check Valves:
 - 1. Silent check valves 2" and smaller shall be horizontal or vertical silent spring check type. Valves shall be rated for 200# WOG.
- D. Balancing Valves:
 - 1. Manual Type:
 - a. Combination balancing and positive shut-off valves shall incorporate a position indicator and memory stop or locking device so the valve can be closed without disturbing the setting, and be returned to the balanced position without further adjustment.
 - b. Balancing valves for sizes 3" and smaller shall be calibrated bronze balancing valves with provisions for connecting a portable differential pressure meter. Meter connections shall have built-in check valves

and knurled caps. Valves shall have integral pointers to indicate the degree of valve opening.

2.2 CHROME PLATED VALVES

Valves in exposed domestic plumbing connections to equipment shall have chrome plated finish.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Installation shall be such that the valve can be fully opened and have at least 6" clearance beyond valve stem handle and sufficient clearance to remove stem for repair.
- B. Locate and orient valves to permit proper operation and access for maintenance of packing, seat and disc. Generally, locate valve stems in overhead piping in horizontal position. Provide a union adjacent to one end of all threaded end valves. Control valves usually require reducers to connect to pipe sizes shown on the drawings. Install butterfly valves with the valve open as recommended by the manufacturer to prevent binding of the disc in the seat.

3.2 DISCHARGE FROM SAFETY AND/OR RELIEF VALVES

Relief valves relieving steam, gas of any type, including compressed air, or liquid above 120 degrees F., shall be piped full size to outside building or as indicated so that discharge cannot hit any person or structure.

3.3 RELIEF VALVE CAPACITY

Valve relieving capacity shall meet all code requirements and also be equal to at least 1.25 of possible heat input to be relieved.

END OF SECTION

SECTION 200120 - PIPING SPECIALTIES

PART 1 – GENERAL

1.1 SCOPE

- A. Provide all labor, equipment, materials, etc., required to complete installation as specified herein and/or shown or scheduled on Contract Drawings.
- B. Work Included: Piping specialties to connect fire protection and plumbing equipment.

PART 2 – PRODUCTS

2.1 BACKFLOW PREVENTERS

- A. Install a backflow prevention device at any point in the domestic water system where the potable water supply comes in contact with a potential source of contamination. Devices shall be certified by a recognized testing laboratory and be AWWA C-511-89 FCCCHR of USC, UPC, and IPC compliant. Listed below is a partial list of connections to the water system which shall be protected against backflow or back siphonage.
 - 1. Atmospheric Vacuum Breaker:
 - a. Hose bibbs and sink faucets w/threaded outlets.

2.2 THERMOMETERS

- A. Light powered, liquid crystal display, °F or °C selector switch and 6" brass stem with adjustable angle as required to read display from eyelevel.
- B. Separable Socket (Well): Brass, extension neck type to clear pipe insulation.
- C. Scale range may be slightly greater than shown to meet manufacturers' standard. Required ranges in degrees F:
Domestic Water.....30 to 180
- D. Equal to Weiss Instruments, Inc "Digital Vari-angle" or Weksler "AAD" series.

PART 3 – EXECUTION

3.1 INSTALLATION

All equipment shall be installed as per manufacturer's recommendation and applicable codes and standards. Provide appurtenances as required for a complete system. Provide all appurtenances as indicated on Contract Drawings, where specified or not.

END OF SECTION

SECTION 200140 - SUPPORTS AND ANCHORS

PART 1 – GENERAL

1.1 SCOPE

Provide all labor, equipment, material, etc., required to complete installation as specified herein and/or shown or scheduled on Contract Drawings.

1.2 SUPPORT

Supports shall be installed in one of the following methods: (1) from wood using coach screw on open construction and hanger flanges on sheeting, (2) from concrete using inserts, (3) from steel using beam clamps, rivets or bolts, (4) from concrete blocks using toggle or through bolts. Fasten supports to building in following order of preference: (1) steel framing, (2) concrete, (3) wood framing, (4) masonry, (5) wood sheathing. Do not support from roof deck without approval. All hangers, rods, and inserts shall be Underwriters' Laboratories approved for the service intended and meet MSS #SP 58 and 69.

PART 2 – PRODUCTS

2.1 HANGERS, SUPPORTS, ANCHORS AND GUIDES

- A. All hangers, fasteners and accessories exposed to view indoors shall be galvanized or zinc plated. Similar installations outdoors shall be hot dipped galvanized materials and fasteners.
- B. Supports, hangers, anchors and guides shall be provided for all horizontal and vertical piping. Selection and application shall be in accordance with ANSI/MSS SP-69.
- C. All pipe supports shall be of type and arrangement hereinafter specified. They shall be so arranged as to prevent excessive bending stresses between supports. Specifically designed hangers shall be fabricated and installed in accordance with ANSI/MSS SP-69.
- D. All bracket clamp and rod sizes indicated in this specification are minimum size only. The CONTRACTOR under this section shall be responsible for structural integrity of all supports. All structural hanging materials except variable spring units shall have a safety factor of 5 built in.
- E. All piping routed on trapeze hangers shall be attached rigidly to same unistrut hanger bar with clamps designed by unistrut manufacturer as approved by PROFESSIONAL. Insulated piping clamps shall encapsulate piping, insulation and saddle.

2.2 BASES AND PADS

- A. Concrete equipment pads shall be constructed of minimum 3000 psi reinforced concrete. Provide $\frac{3}{4}$ " chamfer on all exposed top perimeter edges of pads.
- B. Top of equipment pads outdoors shall be minimum 3" above and below worst case finished grade and be reinforced and of a strength suitable for application.
- C. Pads shall be provided in the following applications:
 - 1. Air conditioning equipment outside building. Size pads to extend from building perimeter and extend minimum eighteen (18) inches around

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equipment on remaining three sides, or as indicated.

2. Backflow preventer enclosures outside building. Size pads to extend minimum twelve (12) inches around equipment on all sides, or as indicated.
3. Floor mounted water heaters, air handling units, boilers, pumps, and where shown or specified on Drawings.
4. Provide similar concrete surrounds at cleanouts, grease interceptors, wet wells, etc., and as indicated.

PART 3 – EXECUTION

3.1 PIPING SUPPORT

- A. All hangers for insulated piping shall be sized to accommodate insulation and shield. No hangers for insulated piping may be installed directly below or onto pipe itself except domestic cold water, and condensate drain piping where insulation is for condensation and/or freeze protection only.
- B. Provide hanger spaced per International Plumbing Code, International Fuel Gas Code, and International Mechanical Code requirements for piping type and size.
- C. Support horizontal PVC pipe with hanger or pier, located close to hub; use one support for each pipe length, or every other joint, whichever is closer. Where maintenance requirements may impose torque, as at a cleanout, support on both sides of torque point.
- D. Provide hanger within 18" of each elbow, also provide hanger within 18" of connection to each piece of equipment.
- E. Support vertical pipe at base and at each floor. In addition, 1" or smaller copper pipe shall be supported at 5' intervals or midway between floors, whichever distance is shorter.
- F. Provide PVC or other approved coating for steel, cast iron or PVC pipe riser clamps. See applicable details.
- G. Pipes passing thru walls shall not bear on building construction. Provide sleeves and fire proofing sealant as per Section *Basic Mechanical Materials and Methods*.
- H. Maximum weights on hanger rods assuming a maximum operating temperature of 450 degrees F. shall be such that stress in tension shall not exceed 9000 psi, using root area of threaded portion.
- I. For copper pipe, supports shall follow schedule and specifications. Supports for uncovered lines shall be especially designed for copper tubing, and shall be of exact O.D. diameter of tubing and shall be copper plated.
- J. Shields at Hangers: Insulated pipe shall be protected at the point of support by a 180 degree insert of high density, 100 psi, waterproofed calcium silicate encased in a 180-degree galvanized sheet metal inverted saddle. Insert to be same thickness as gauges shown in chart below. Insulation insert to extend 1" beyond sheet metal on all insulated water lines. If pipe hanger spacing exceeds 12 feet, use double layer sheet metal shields. Check Section *Mechanical Insulation* for Alternatives.

PIPE SIZE	SHIELD	MINIMUM

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	LENGTH	GAUGE
1/2" - 2"	8"	24
2-1/2" - 4"	12"	20
6" - 8"	16"	16

- K. Provide all steel required for support of pipes and equipment other than steel shown on STRUCTURAL ENGINEER'S Drawings.
- L. All pipe supports shall be designed to avoid interferences with other piping, hangers, electrical conduits and supports, building structures and equipment.

3.2 OTHER MOUNTINGS

- A. Any piece of equipment installed in a finished ceiling or wall area shall be supported independently of the building finish. Ceiling mounted items shall be supported directly from the building structure.
- B. Support piping from structural steel members by malleable iron or formed steel beam clamps. Where suspended from concrete slabs, install inserts of malleable iron during building construction.
- C. Wire or perforated hangers will not be permitted. Provide adjustable split ring swivel malleable iron hangers for horizontal runs up to and including 3" pipe size. Provide adjustable steel clevis type hangers for pipes over 3".
- D. Provide malleable iron split ring hanger with copper finish and copper plated malleable iron adjuster for use with copper piping. For insulated piping, provide hangers sized to accommodate insulation.

END OF SECTION

SECTION 200170 - ELECTRICAL REQUIREMENTS

PART 1 – GENERAL

1.1 MECHANICAL WORK

All work performed under this Contract shall be in accordance with Division Electrical.

PART 2 – PRODUCTS

2.1 STARTERS

- A. For each and every motor provided by CONTRACTOR, a new proper motor starter shall be furnished for installation, except that all starters for ½ horsepower single phase and smaller motors as specified and/or required shall be manual type.
- B. Heaters shall be of the melting alloy type, sized to the exact nameplate running current of the motor. Manually operated motors with magnetic controllers shall be provided with oil tight pushbutton stations and automatically controlled motors shall be provided with oil tight "hands off auto" automatic switches. All magnetic starters shall be provided with red bull's eye pilot light in cover. Energy for controlled circuits shall be taken from the load contacts from the starters. All power wiring and control wiring shall be run in rigid conduit in damp locations or electrical metallic tubing in dry locations, and shall conform to NEC Standards. Provide two sets each of normally open and normally closed auxiliary contacts for all magnetic starters.
- C. For all starters for three phase motors, provide both overload and under voltage and over-voltage protection in all phases and protection from phase loss and phase reversal.
- D. For manual and automatic controlled operation of 3/4 HP and larger motors, furnish magnetic motor starter with:
 - 1. Maintained contact starter with "hand off auto" switches.
 - 2. Trip free, thermal overload relays.
 - 3. Capable of accepting 3 external electric interlocks.
 - 4. "Red" run pilot bulb indicator.
- E. Where interlock or automatic operation is specified, regardless of HP, provide magnetic starter complete with "run off auto" switch so connected that in "run" or "auto" all safety controls shall stop the motor. Provide number and type of auxiliary normally open and/or closed contacts as required by specified control sequence.
- F. Size 2 and larger starters shall have control circuits individually fused from line side of starter, or lead side of breaker, on combination unit. Starters on service above 240 volts shall have 120 volts, built in control circuit transformer fused from line side.
- G. Each electrically operated item of equipment shall be suitable for proper operation on the electrical supply to which it is to be connected as directed on the Electrical Drawings. Prior to delivery on job site, it shall be the responsibility of the CONTRACTOR and any Sub-Contractors, equipment suppliers, etc. to determine from the Electrical Drawings the characteristics of the electrically operated item, and to furnish each item accordingly. CONTRACTOR shall pay the cost due to any modifications resulting from differences as compared to Basis of Design products.

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- H. Provide soft start and soft stop magnetic motor starters for all motor three phase loads above 5 HP, as Magnetek Series RVS–DN with digital microprocessor circuitry, and include the safeties as detailed above, with auto reset.

2.2 MOTORS

- A. All motors under this Contract shall be provided with thermal overload protection.
- B. Equipment shall operate properly under a 10% plus or minus voltage variation, and a 5% plus or minus frequency variation.
- C. Unless noted otherwise, motors shall be squirrel cage induction type with ball bearings. Motors ½ HP and smaller shall be 120 volts, single phase, with permanently lubricated bearings; ¾ HP and larger shall be 3-phase, Design "B" or "C", drip proof type, of minimum power factor and energy efficiency as listed herein.
- D. Motors shall be premium efficiency type as defined by energy policy act of 1992 (EPACT) and latest version of IEEE Standard 112, Test Method B.

HP	EFFICIENCY	POWER FACTOR
1	84	72
1.5	85.5	73.5
2	85.5	70.6
3	89.5	77.5
5	89.5	81
7.5	91.7	78.9
10	91.7	83
15	93	81
20	93.6	84
25	93.6	83.5
30	94	85.1
40	95.5	76
50	95.5	84.2
60	95.5	84.5
75	96	83.4
100	96	84.4

- E. Motors shall be rated for continuous, full load duty and capable of withstanding momentary overloads of 50%. Select motors so actual load does not exceed nameplate ratings, and does not use motor "service factor". All motor furnished for this project shall have minimum service rating factor of 1.15. All motors shall be highest energy efficient type for all mechanical applications.
- F. Except where interlock or automatic control is required, single speed single phase motors, ½ HP and smaller shall have manual motor switch with pilot light and thermal overload protection.
- G. Each motor to be installed outdoors shall be of the totally-enclosed fan-cooled type, or housed in a weatherproof housing. Motors for hazardous locations shall be properly furnished to suit application.

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- H. Multi-speed motors shall, except as noted, be consequent pole, variable torque, single winding. When the speed ratios or the load characteristic dictates, the multispeed motors shall be separate winding types. Variable speed motors operating over an adjustable range of speeds shall be motors specifically designed and rated for this duty.

2.3 ELECTRICAL FOR EQUIPMENT

- A. Motor controllers, protection devices, etc., for control and protection of equipment shall be furnished with the equipment, but installed and electrically connected to power source under Division Electrical.
- B. NEMA Standards shall be taken as minimum requirements for Electrical equipment.
- C. CONTRACTOR shall provide and install all disconnects for all MECHANICAL motors and loads unless equipment is provided with integral disconnect(s).
- D. All three phase motors in occupied areas shall be "quiet" rated and so marked.
- E. On all three phase motors, provide both overload and under voltage and over-voltage protection in all phases and protection from phase loss and phase reversal.
- F. Suitable enclosures for all electrical equipment shall be provided to suit environment as per NEMA and NFPA standards.
- G. Clearances of 36" shall be maintained around equipment less than 400V. Clearances of 48" shall be maintained around equipment greater than 400V.

PART 3 – EXECUTION

3.1 GENERAL

- A. Where electrical voltage and phase characteristics are specified hereinafter, verify them with the Electrical Drawings. In case of discrepancy between the Specifications and the Electrical Drawings, the Electrical Drawings shall govern.
- B. The CONTRACTOR shall provide power to all circuits, controls, and safety devices to every piece of mechanical equipment specified or shown on Drawings whether a power source is indicated or not on Electrical Drawings.
- C. The CONTRACTOR shall provide and extend fire alarm connections to all larger air handling equipment and provide code required smoke/heat detection sensors, etc., and automatic shutdown in the event of positive fire/smoke detection from any fire alarm sensor in same zone as served by same air system.
- D. Control wiring (120V. and less) shall be provided under *Division 20, 21, 22 and 23* and extended from the 120V. power circuits indicated on the Electrical Drawings. All wiring for voltages higher than 30 volts shall be done by a licensed electrician.

END OF SECTION

SECTION 200190 - MECHANICAL IDENTIFICATION

PART 1 – GENERAL

1.1 SCOPE

- A. Piping System Identification
- B. Valve Identification System
- C. Equipment Identification
- D. Miscellaneous Identification

1.2 REFERENCES

ANSI A13.1 – Scheme for the Identification of Piping Systems

PART 2 – PRODUCTS – SPECIFIED AS PER INDIVIDUAL APPLICATION IN PART 3

PART 3 – EXECUTION

3.1 IDENTIFICATION OF PIPING SYSTEMS

- A. Identify all pipe after final painting and/or insulation with manufacturer's preprinted labels at the following minimum locations:
 - 1. Straight runs of piping with a maximum spacing of twenty (20) feet.
 - 2. Adjacent to each valve.
 - 3. Adjacent to each branch takeoff point.
 - 4. On each side of where piping passes through walls/floors.
- B. Letter shall be sized in accordance with the following:

OUTSIDE DIAMETER OF PIPE COVERING	MINIMUM WEIGHT OF LEGEND LETTERS
Up to 3/4"	1/2"
1" to 1-1/4"	3/4"
1-1/2" to 2"	1"
2-1/2" to 6"	1-1/2"

- C. At each legend, include a manufacturer's label with an arrow to show normal flow.
- D. Identify location of outside underground piping by: (1) 4" x 18" concrete stakes, flush with finish grade, located above lines at end and/or corners or (2) by 2" x 2" brass plates embedded in building walls above pipes.
- E. Identify all non-metallic piping below grade with 2" wide metalized tracer continuous roll identification tape, with service, as Brimar Industries "Underground Tape 2" Detectable". Install tape $\pm$ 12" below finished grade directly atop buried pipe, and 12-gauge bare copper tracer wire taped continuously to top of piping service. All tracer tape/wire shall be extended continuously between concrete stakes, and tied to stakes $\pm$ 6" below finished grade.

3.2 IDENTIFICATION OF PIPING ABOVE GRADE

- A. All piping exposed to view or concealed shall include manufactured labels on pipe in

a visible location. Label shall be attached to pipe every twenty feet (20'). Labels shall be installed after piping has been insulated.

B. Labels to be utilized as follows.

1. In exposed applications, CONTRACTOR shall utilize pre-coiled, snap in place type markers as Seton "Setmark". On 6" and larger pipe, CONTRACTOR shall utilize nylon ties to secure marker to piping.
2. In concealed applications, CONTRACTOR shall utilize a pressure-sensitive tape manufactured legend on all installations. Tape shall be tamper resistant vinyl tape for indoor as Seton "Opti-Code" and outdoor installations as Seton "Ultra-mark."
3. Tape legend colors shall meet ANSI recommendations.
4. On piping where markers do not include directional arrows, CONTRACTOR shall include similar manufactured stick-on flow arrows on all pumped circulating systems as Seton "Arrows On A Roll" with colors to match pipe legend tape identification.

3.3 VALVE IDENTIFICATION

- A. All major and branch valves in the HVAC, plumbing or fire protection system (except check valves) shall be tagged and numbered. A complete system schematic and floor plan location drawing with all such valves referenced to the tag assigned to that valve shall be framed and mounted where directed by the Professional. A copy of this system schematic shall also be included in each of the Operations and Maintenance Manuals. Submit same to PROFESSIONAL for approval, prior to final mounting and inclusion in O & M Manual. Valve tags shall be brass, minimum 1¼" in diameter, engraved with white lettering on a colored background.
- B. Lettering shall be minimum ½" high, with sequential lettering designations distinct for each separate functional service, i.e. CW-1 for 1st cold water valve, etc. Submit proposed floor plan layout with valves to be tagged, schematic of valve chart and system, etc., to PROFESSIONAL for approval. Tags shall be as Seton Series 31490.
- C. Building main supply/service entrance valves shall be tagged with 2-1/2" wide x 1" tall stainless steel plates with screw mounting holes at corner. Tags shall include engraved black filled letters. Standard lettering size can be obtained from the Owner to maintain district wide consistency. Lettering shall be as indicated below stacked on two lines.
 1. Water Cut Off Per MDE Requirements

3.4 EQUIPMENT IDENTIFICATION

- A. All equipment, starters, controls panels, switches, thermostats, humidistats and other control devices shall be permanently labeled with equipment being served. Equipment labels shall correspond to those shown on the Contract Documents.
- B. Individual functions and equipment on indicators and controllers on control panels shall be clearly permanently identified. Color code of labels, marking and identification shall be approved by PROFESSIONAL. This applies to the HVAC system, override panel, microprocessor time clocks and specialty annunciation

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specified in Section Controls and Instrumentation.

1. Labels for equipment, starters and control panels shall be phenolic type with minimum 3/4-inch tall engraved lettering.
 2. Identification for individual controls devices including thermostats, humidistats, relays, switches, etc. shall be labeled with either phenolic type with minimum 1/2-inch tall engraved lettering or stick-on type from lettering machine.
- C. A reduced scale floor plan drawing with all devices referenced to the equipment served shall be framed and mounted where directed. A copy of this reduced scale floor plan drawing shall also be included in each of the Operations and Maintenance Manuals. Submit same to PROFESSIONAL for approval, prior to final mounting and inclusion in O & M Manual.

END OF SECTION

SECTION 200240 - MECHANICAL SOUND AND VIBRATION CONTROL

PART 1 – GENERAL

1.1 SCOPE

Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.

1.2 APPLICABLE STANDARDS

- A. ASHRAE, 2019 HVAC Applications Handbook, Chapter 49, "Noise and Vibration Control".
- B. The CONTRACTOR shall be responsible for providing and installing vibration isolation of the appropriate type and size for proper weight loading to meet the requirements of the specifications, and in accordance with instructions of the equipment manufacturer or vibration isolator manufacturer or its vendor.
- C. On completion of the work, the ENGINEER shall carry out an inspection and shall inform the installing CONTRACTOR of any further work that must be completed before final approval is obtained.

1.3 MANUFACTURER

- A. All vibration isolators shall be supplied by a single approved manufacturer.
- B. The manufacturer's standard vibration isolation will be acceptable only if it meets this specification.

1.4 VIBRATION AND SOUND CONTROL

- A. All rotating equipment shall be isolated from correcting piping, ductwork, structure or other rigid utilities, etc., by means of the appropriate vibration isolation. The CONTRACTOR shall provide and install the appropriate vibration isolation on any equipment, etc., with moving parts, whether indicated on Plans or not.
- B. The CONTRACTOR shall provide and install appropriate sound isolation as required to restrict sound production or transmission. CONTRACTOR shall install this insulation, baffle, etc., where indicated or as directed by ENGINEER.

PART 2 – PRODUCTS

2.1 VIBRATION ISOLATOR TYPES

- A. Unit FN (Floor Neoprene) - Smaller floor mounted equipment and for spacing between equipment and drain pans.
 - 1. These isolators shall be double deflection neoprene waffle pad. Pads shall be a minimum of 5/16" thick with size cut as required for particular equipment weight being supported.
 - 2. Isolators shall be Mason Type W – Neoprene Waffle Pads or approved equal.

2.2 EXTERIOR METAL PARTS

- A. All metal parts of vibration isolation units installed out of doors shall be hot dip galvanized after fabrication.

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- B. Galvanizing shall comply with ASTM A123, A153 and 386 as applicable.
- C. At the time of shipment to the job site, submit to the CONTRACTOR with copy to the ENGINEER, a certified statement by the galvanizer indicating conformity of galvanizing to ASTM Specification.

PART 3 – EXECUTION

3.1 GENERAL

- A. Minimum static deflection of each vibration isolator unit shall be as shown in the equipment schedules and/or as described for each specific piece of equipment in these Specifications.
- B. Locations of all vibration isolation devices shall be selected for ease of inspection and adjustment.

3.2 EQUIPMENT MOUNTING

- A. No equipment unit shall bear directly on vibration isolators unless its own frame is suitably rigid to span between isolators and such direct support is approved by the equipment manufacturer. All support frames shall be sufficiently stiff and rigid so as to prevent distortion and misalignment of components installed thereon.
- B. Unless otherwise indicated, all equipment mounted on vibration-isolated bases shall have a minimum operating clearance of 2 inches between the equipment and the concrete housekeeping pad or floor beneath the equipment. The clearance space shall be checked by the CONTRACTOR to ensure that no construction debris has been left to short circuit or restrict the proper operation of the vibration isolation system.
- C. All wiring and other connections to vibration-isolated units shall be made flexible in order to avoid short-circuiting the isolators. A minimum 4-foot length of armored flexible conduit or cable installed in the shape of a U is acceptable for electrical connections. In the case of large diameter conduits, a sheet metal duct with flexible connection may be used for conduit connections to vibrating equipment. Flexible material shall be the same as that described for ducts connecting to fans.
- D. Under no conditions shall piping, ductwork or conduit be suspended from one another or physically contact one another. Vibrating systems shall be kept free from non-vibrating systems.
- E. Vibration isolation hangers shall be positioned so that hanger housings may rotate a full 360 degrees without contacting any object.

3.3 DUCTS

- A. The AHU returns, OSA, and discharge shall be connected to the ductwork with a flexible connector as described below, in order to prevent short-circuiting, and for sound and vibration isolation. Weatherproofing material shall be utilized when installed on exterior installations. Install connectors with slack, avoiding tight or misaligned connections.
- B. All other ducts connecting fans, etc., shall have a flexible connector as described above.

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C. Flexible duct connectors shall be:

APPLICATION	METAL END CONNECTIONS	FABRIC
Split systems and fans less than 2200 CFM air delivery capacity.	Minimum 3" wide 28 gauge galvanized, as Duro Dyne "Econo Fab" Series with minimum 4" wide fabric.	Indoors: Minimum 15 oz./sq. yd., as Duro-Dyne "Excelon" Series with vinyl coated woven nylon/polyester blend. Outdoors: Minimum 17 oz./sq. yd., as Duro-Dyne "Therma Fab" Series with Silicon Rubber coated woven fiberglass fabric.
Larger Commercial HVAC Systems with air delivery above 2200 CFM air delivery capacity.	Minimum 3" wide 24 gauge galvanized, as Duro Dyne "Super Metal Fab" Series, with minimum 6" wide fabric.	Indoors: Minimum 22 oz./sq. yd., as Duro-Dyne "Excelon" Series with vinyl coated woven nylon/polyester blend. Outdoors: Minimum 24 oz./sq. yd. As DD "Durolon" Series with Hypalon coated woven fiberglass.

END OF SECTION

SECTION 200250 - MECHANICAL INSULATION

PART 1 – GENERAL

1.1 SCOPE

- A. It is intended that all heating and/or air conditioning ductwork, all storm drain piping above slab on grade and all domestic water piping above slab on grade throughout this project be insulated, except as specifically stated otherwise hereafter.
- B. Insulation shall include all insulating materials their applications, bands, tie wire, and weather protection for all pipe, fittings, valves, and equipment as indicated and as specified herein.
- C. Piping systems requiring insulation, types of insulation required, and insulation thickness shall be as listed herein. All fittings, flanges, and valves (except valve stems, hand wheels, and operators) in piping systems requiring insulation shall be insulated unless otherwise specified. Fitting, flange, and valve insulation shall be premolded, precut, or job fabricated insulation of the same thickness and conductivity as used on adjacent piping. Insulation exterior shall be cleanable, grease resistant, non-flaking and non-peeling.

PART 2 – PRODUCTS

2.1 PIPING INSULATION

- A. Fiberglass pipe insulation (FG)
 - 1. Insulation shall have a thermal conductivity $k=0.23$ at 75 degrees F.
 - 2. Insulation shall include a white ASJ with self-sealing overlap joints and seams.
 - 3. Insulation shall be equal to Johns Manville "Micro-Lok" or approved equal.
- B. Flexible elastomeric pipe insulation (FU)
 - 1. Insulation shall have a thermal conductivity $k=0.25$ at 75 degrees F.
 - 2. Insulation shall be equal to Armacell "AP Armaflex".
- C. Phenolic (P)
 - 1. Insulation shall have a thermal conductivity $k=0.15$ (density 10 pcf nominal)
 - 2. Insulation shall be equal to Insul-Phen.
- D. PVC pipe and fitting covers.
 - 1. Pipe and fitting covers shall be 20 mill thick flame retardant PVC. Fitting covers shall be neat, tight fitting radius type.
 - 2. Pipe and fitting covers shall be equal to Zeston type 300 or approved equal.
- E. Metal Protective Jacket
 - 1. Sheet Aluminum: ASTM B209, 3003 alloy, H 14 temper, 0.016 inch thick.
 - 2. Fitting Covers: Factory fabricated from not lighter than 0.020-inch thick type 3003 sheet aluminum.
 - 3. Bands: 3/4-inch wide .007 aluminum (or .005 stainless steel).

2.2 DUCTWORK INSULATION

- A. Rectangular Ductwork Interior Acoustical Liner
 - 1. See Section *Ductwork*.
- B. External Duct Wrap Insulation (Duct Wrap)
 - 1. Insulation shall be 2.2" thick and 3/4 pcf density fiberglass material with FSK facing. The "k" factor at 75° F., mean temperature shall not exceed 0.31 and shall meet NFPA 90A & 90B Standards.
- C. Dual Wall Round and/or Oval Ductwork Insulation
 - 1. See Section *Ductwork*.

PART 3 – EXECUTION

3.1 GENERAL INSULATION INSTALLATION REQUIREMENTS

- A. The insulation shall be applied by licensed insulation applicators and all work shall be performed in a neat and workmanlike manner.
- B. No insulation shall be applied over pipes, fittings, or other surfaces, which are not clean.
- C. Insulation shall be applied after pipes have been thoroughly tested and proven tight by the CONTRACTOR.
- D. Piping insulation thru rated walls shall be coordinated with Section *Basic Mechanical Materials and Methods* and approved pipe sleeve and fire stop with UL Listing.
- E. Insulation shall be clean and dry when installed and during the application of any finish.
- F. Install materials neatly with smooth and even surfaces with jackets drawn tight and smoothly cemented down on longitudinal and end laps.
- G. Scrap pieces shall not be used where a full-length section will fit.
- H. Pipe insulation shall be continuous through sleeves, wall and ceiling openings.
- I. A PVC grommet shall be utilized at metal stud penetrations of piping, and insulation shall be installed snug to both sides of penetration with ends of piping insulation vapor sealed if specified.
- J. Piping and ductwork shall be individually insulated.
- K. Chrome plated pipes and pipes used solely for fire protection shall not be insulated.
- L. Equipment nameplates, access plates in fan housings and ductwork and the like for ventilating and air heating systems, shall not be insulated but insulation must be carefully beveled and sealed around it.
- M. Ductwork insulation shall be continuous through sleeves, wall and ceiling openings except at fire dampers in ductwork systems.
- N. Vapor Barrier Installation
 - 1. A complete moisture and vapor seal shall be provided wherever insulation terminates against metal hangers, anchors and other projections through

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insulation on cold surfaces for which a vapor seal is specified as identified in Part 3 paragraph 3.03 of this specification section.

2. Seam and fitting covers shall be sealed with two (2) generous brush coat of fire resistant vapor barrier coating, applied at all longitudinal and circumferential laps.
3. Ends of sections of insulation that butt against flanges, unions, valves, and fittings, and joints at intervals of not more than 12 feet on continuous runs of pipe shall be coated with a vapor barrier coating.
4. Breaks and punctures in the jacket material shall be patched by wrapping a strip of jacket material around the pipe and cementing, coating as specified for butt strips. The patch shall extend not less than 1½" past the break in both directions.
5. At penetrations such as thermometers, valve stems, etc., the voids in the insulation shall be filled with vapor barrier coating and the penetration sealed with a brush coat of the same coating.
6. PVC fitting jackets in concealed applications shall be with a strip of insulation jacket and brush coat of vapor barrier sealant.
7. PVC fitting jackets in exposed applications shall be neatly covered with a PVC/vinyl tape neatly smoothed.

O. Installation at Hangers and Anchors

1. Pipe insulation shall be continuous through pipe hangers.
2. Where pipe is supported by the insulation, galvanized sheet metal shields or saddles 12 inches long shall be provided. Shields/saddles shall be 20-gauge galvanized sheet metal for pipes 6" and smaller and 18 gauge for pipes 8" and larger.
3. Where shields are used on pipes 2 inches and larger, insulation inserts shall be provided at points of hangers and supports.
 - a. Insulation inserts shall be of calcium silicate, cellular glass (minimum 8 pcf), molded glass fiber (minimum 8 pcf), or other approved material of the same thickness as adjacent insulation.
 - b. Inserts shall have sufficient compressive strength to adequately support the pipe without compressing the inserts to a thickness less than the adjacent insulation.
 - c. Insulation inserts shall cover the bottom half of the pipe circumference 180 degrees and be not less in length than the protection shield.
 - d. Vapor barrier facing of the insert shall be of the same material as the facing on the adjacent insulation.
 - e. Seal inserts into the insulation with vapor barrier coating.
4. Where protection saddles are used, fill all voids with the same insulation material as used on the adjacent pipe.

5. Insulate and vapor seal insulation at anchors same as piping for a distance not less than four times insulation thickness to prevent condensation.

3.2 PIPING INSULATION INSTALLATION

A. Fiberglass pipe insulation (FG)

1. Install insulation with longitudinal laps and butt strips additionally smoothly secured with Benjamin-Foster 85-20 adhesive.
2. Fittings and valves on pipe shall be similarly insulated with thickness equal to the adjacent pipe.

B. Flexible elastomeric pipe insulation (FU)

1. Miter 90 degree turns and elbows, tees, and valve insulation.
2. Secure longitudinal joints with vinyl tape on 9-inch centers.
3. Bond cuts, butt joints, ends, and longitudinal joints with adhesive. After adhesive cures, apply 2-inch wide pressure sensitive adhesive vinyl tape over bonded cuts, joints, and ends.

C. PVC pipe and fitting covers.

1. PVC pipe and fitting covers shall be installed with a smooth appearance and no visible wrinkles.
2. All longitudinal seams shall be installed such the joints facing up or to the back of the finished product.
3. All longitudinal and circumferential PVC jacket joints and connections shall be spot welded every 12" with Perma Weld Adhesive and subsequently neatly sealed with tight fitting pressure sensitive vinyl tape, installed without wrinkles.

D. Metal Jacket Installation

1. Metal jackets shall have side and end laps at least 2 inches wide with the cut edge of the side lap turned under one inch to provide a smooth edge.
2. Secure jackets in place with aluminum or stainless-steel bands on 9 inch centers.
3. Place laps to shed water.
4. Seal laps with weatherproof coating.
5. Where pipes penetrate exterior walls, continue the increased insulation thickness required for piping exposed to weather and the metal jackets through the sleeve to a point 2 inches beyond the interior surface of the wall.
6. In outside locations protect fittings, flanges, and valves with a weatherproof coating prior to installation of metal covers. Secure metal covers for fittings, flanges, and valves in place with metal bands and seal with a weatherproof coating.

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3.3 PIPING INSULATION APPLICATIONS

PIPING INSULATION MATERIAL TYPE, SERVICE JACKET, VAPOR BARRIER AND THICKNESS TABLE									
SERVICE	INSULATION MATERIAL (NOTE 'A')	TYPE OF SERVICE JACKET (NOTE 'B')	VAPOR BARRIER REQ' D	INSULATION THICKNESS (INCHES)					NOTES
				1/2" – 1 1/4"	1 1/2" – 3"	3 1/2" – 6"	8" – 10"	11" – 36"	

DOMESTIC HOT AND RECIRCULATING	FG	B	YES	1	1.5	1.5	1.5	1.5	1,2,3,4
	FU	C	NO	1	1.5	1.5	1.5	1.5	
	P	B	NO	0.5	1	1	1	1	
DOMESTIC COLD WATER	FG	B	NO	0.5	1	1	1	1	1,2,3,4
	FU	C	NO	0.5	0.75	0.75	0.75	0.75	
A/C CONDENSATE DRAIN LOCATED INSIDE BUILDING	FG	A OR B	YES	1	1	1	1	1	4,5
	FU	C	NO	0.75	1	1	1	1	
DRINKING FOUNTAIN DRAIN PIPING (ON SEWER TIE-ON)	FG	B	YES	1	1	1	1	1	5
	FU	C	NO	1	1	-	-	-	
REFRIGERANT PIPING	FU	C	NO	SEE NOTES	SEE NOTES	-	-	-	6, 7

NOTE 'A' – INSULATION MATERIAL				
MATERIAL	SPEC	TYPE	CLASS / GRADE	
FU	FLEXIBLE UNICELLULAR	ASTM C 534	-	-
FG	FIBER GLASS	ASTM C 547	I	1
P	PHENOLIC	ASTM C 552	-	-
NOTE 'B' – TYPE OF SERVICE JACKET REQUIRED				
A	FOIL BACKED ALL SERVICE JACKET (ASJ)			
B	PAPER ASJ			
C	NONE			

TABLE NOTES:

- Flexible unicellular insulation shall be utilized on domestic piping concealed within interior and exterior walls and plumbing chases.
- Note that higher density insulation inserts shall be utilized on all water piping larger than 1-1/2" size, at all hanger/saddle supports, etc.
- Insulation located outside shall be one inch thicker than shown in table above.
- A full coverage PVC jacket shall be required on insulated piping and fittings exposed in mechanical rooms, in crawlspace, and in interior exposed applications everywhere. See Section *Mechanical Identification* for color requirements.
- Drain piping in concealed applications may be insulated with flexible unicellular or fiberglass.

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6. Refrigerant piping shall be insulated as follows. Conventional heat pump or 2-pipe variable refrigerant systems shall have the larger pipe (hot gas line during heating operation) based upon the thickness corresponding to hot gas lines below and NOT the suction line thickness.
 - a. Suction lines - $\frac{3}{4}$ " thick for pipes less than 1" in size, 1" thick for pipes equal to or greater than 1" in size.
 - b. Liquid lines – 1" thick for pipes less than 1-1/2" in size, 1.5" thick for pipes equal to or greater than 1-1/2" in size.
 - c. Hot gas lines – 1.5" thick for pipes less than 1-1/2" in size, 2.0" thick for pipes equal to or greater than 1-1/2" in size.
7. Provide metal jackets over insulation on all insulated piping exposed to outdoor weather (including refrigerant piping).

3.4 DUCTWORK INSULATION INSTALLATION

- A. Rectangular Ductwork Interior Acoustical Liner
 1. See Section *Ductwork*.
- B. External Duct Wrap Insulation
 1. Insulation shall be installed in a manner to prevent compression of the insulation.
 2. When ductwork (rectangular or flat oval) with any vertical or bottom side is greater than 18", install pins and clips in a 12" o.c. grid, with pins within 4" of any longitudinal edge. Excess length of pins shall be snipped and top of pin/washer covered with pressure UL 181 pressure sensitive tape.
 3. All longitudinal and circumferential insulation seams shall be sealed with 3" wide pressure sensitive tape bearing the UL 181 label.
- C. Dual Wall Round and/or Oval Ductwork Insulation
 1. See Section *Ductwork*.

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3.5 DUCTWORK INSULATION APPLICATIONS

DUCTWORK INSULATION MATERIAL TYPE, VAPOR BARRIER AND THICKNESS TABLE				
DUCTWORK FUNCTION/TYPE	INSULATION MATERIAL	VAPOR BARRIER REQ' D	INSULATION THICKNESS (INCHES)	NOTES
Rectangular Low Pressure Supply Air	DUCT WRAP	YES	2.2	1
Round/Oval Low Pressure Supply Air	DUCT WRAP	YES	2.2	2
Rectangular Low Pressure Return Air	DUCT WRAP	YES	2.2	1
Round/Oval Low Pressure Return Air	DUCT WRAP	YES	2.2	
Rectangular Low Pressure Exhaust Air	SEE NOTES	-	-	3
Round/Oval Low Pressure Exhaust Air	NONE	-	-	
Rectangular Low Pressure Outside Air	DUCT WRAP	YES	2.2	
Round/Oval Low Pressure Outside Air	DUCT WRAP	YES	2.2	
Rectangular Low Pressure Heat Recovery Exhaust Air	SEE NOTES	-	-	1
Round/Oval Low Pressure Heat Recovery Exhaust Air	NONE	-	-	
Miscellaneous Ductwork and Accessories	DUCT WRAP	YES	2.2	4

TABLE NOTES:

1. See Section *Ductwork* for:
 - a. Additional acoustical internal insulation required in addition to specified external insulation. Omit external duct wrap insulation on indoor exposed ductwork.
 - b. Interior liner required on ductwork located outdoors.
2. See Section *Ductwork* for additional double wall sandwich insulation required in addition to specified external insulation.
3. See Section *Ductwork* for acoustical internal insulation required.
4. Miscellaneous Insulation and Acoustical Treatment Requirements:
 - a. Air Distribution Devices (Grilles, Registers and Diffusers):
 - i. The concealed frame and housing of all such devices above ceilings, in attics, walls, crawlspaces, etc., shall be factory insulated.
 - ii. When factory insulation is not available, duct wrap insulation shall be installed on any concealed frame, housings, plenums, etc.
 - b. Dryer exhaust ductwork routed concealed indoors, in walls, attics, etc., shall be insulated.

END OF SECTION

SECTION 220430 - PLUMBING SPECIALTIES

PART 1 – GENERAL

1.1 SCOPE

- A. Domestic water, sewer, roof drainage and condensate drains, including piping, equipment and all necessary accessories as designated in this section.
- B. Furnish all cleanouts and/or test tees as shown on Contract Drawings and required by Code. Cleanouts shall be the same size as the pipe they serve, except that 4 inches shall be the largest size required. Cleanouts shall be provided at the foot of each soil stack and of each run, change in direction, and mains, not to exceed 50 feet apart inside of building and 80 feet apart outside of building. The smallest flush floor cleanout shall be 3" unless otherwise noted.

PART 2 – PRODUCTS

2.1 FLOOR DRAINS

- A. Floor drains shall be in accordance with ANSI A112.21.1. Provide caulking flange for connection to cast iron pipe, screwed outlets for connection to steel pipe, and side outlet when shown. Provide suitable clamping device and extensions if required, where installed in connection with waterproofing membrane. (Submit detailed shop drawings of these drains). Double drainage pattern floor drains shall have integral seepage pan for embedding in floor construction, and weep holes to provide adequate drainage from pan to drain pipe.
- B. The following plumbing drains are Jay R. Smith Models, however equal Zurn, Wade, Jonespec, MIFAB, Watts or Josam models are acceptable. Note: Provide flashing clamp when required with waterproofing membrane.
 - 1. FD-1 – Floor Drain: (Toilet Areas) Zurn Model Z415-7B, duco coated cast iron body with nickel bronze 7" round strainer, clamping collar. Drain shall have trap primer connections where indicated. Size as indicated.
 - 2. FD-2 – Floor Drain: (Area Mechanical Room Traffic Type) Zurn Model Z541, duco cast iron body, flashing collar, 12" diameter cast iron traffic grate and slotted sediment bucket.
 - 3. FD-3 – Floor Drain: (Recessed Grate) Zurn Model Z415-7I, duco coated cast iron body with nickel bronze 7" diameter extended rim strainer, clamping collar. Drain shall have trap primer where indicated. Size as indicated. Top lip to be installed flush with finished floor.
 - 4. FD-4 – Floor Drain: (Commercial Washer Lint Trough) Striem Tuff Trough Model TT-3, 3/4" polyethylene with removable, corrosion-resistant primary filter screen and secondary filter basket. Trough shall be furnished with a nested cover, internally sloped floor, and suitable for above- or below-grade installation. Trough shall be equipped with a plain end outlet. Inlet connections are field installed. Cover shall have a maximum 450 lbs. load capacity. Maximum operating temperature 165°F intermittent. Trough shall be certified to IAPMO IGC 167-2011ae2 and carry a UPC listing. Size 18"x12"x48" long.

2.2 TRAPS

- A. Provide traps on all sanitary branch waste connections from fixtures or equipment not provided with traps. Exposed brass shall be polished brass chromium plated with nipple and setscrew escutcheons. Concealed traps may be wrought cast brass.
- B. All drains, overflow, condensate and relief, to be routed to a trapped hub or floor drain. If plans are not specific, check with PROFESSIONAL over routing of such drains.

2.3 OTHER DRAINS

Other required drains, including condensate drain piping, relief and overflow drain piping shall be provided and installed by CONTRACTOR. See BASIC MECHANICAL MATERIALS AND METHODS for piping specifications. Drains with outlets outdoors shall include insect screen neatly attached over opening.

2.4 CLEANOUTS

- A. Cleanouts shall be as manufactured by Wade, Jay R. Smith, Zurn, Watts, or Josam, and shall be as follows:
 - 1. Inside building, exposed on walls Zurn Model Z1446.
 - 2. Inside building where tile floors occur Zurn Model Z1400.
 - 3. Inside building where ceramic or quarry tile occurs Zurn Model Z1400.
 - 4. Outside building where concrete occurs Zurn Model Z1406.
 - 5. Outside building, no paving Zurn Model Z1449 with 18" x 18" x 4" concrete pad poured around cleanout with sloped top to shed water.
 - 6. Inside/Outside Building, acid resistant type, as Orion type "FCO-RD".
- B. All interior cleanouts to have nickel bronze finish and exterior cleanouts a brass finish unless otherwise noted. All flush grade cleanouts and cleanouts in walks, etc., shall have inset square key stainless-steel covers.

PART 3 – EXECUTION

3.1 INSTALLATION: (DRAINS)

- A. Floor drains shall be installed according to manufacturer's recommendations. Provide and install all flashing and weatherproofing as required. Adjust extension sections on all drains as required for proper height adjustment.
- B. All floor drains connected to sanitary waste system to be trapped. Connect floor drains to sanitary waste piping as indicated on Contract Drawings.
- C. The CONTRACTOR shall connect to roof drains and exterior roof downspouts and route new piping to its conclusion outside of building as indicated on Contract Drawings.
- D. Each AC equipment drip and drain opening which normally or frequently discharges water (such as air conditioning unit drains, pump base and stuffing box drips, overflows, and similar drips and drains) shall be connected to the drain openings or piped down directly over the floor drains which are provided for the purpose, as

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applicable, whether indicated on the Drawings or not.

- E. Each water relief valve discharge shall be piped down to 6" above floor, but not necessarily over a floor drain or connected to a drain opening, unless otherwise indicated. No drain piping is required from the discharges of drain valves, unless otherwise indicated.
- F. The top of all floor and trench drain strainer covers shall be cleaned and polished prior to final inspection by the PROFESSIONAL.
- G. Drains shall be provided at all coils, receivers, pump suction lines, pump plates where facilities are provided and at all low points of the systems. Such drains shall consist of the necessary pipe, valves and fittings required in the opinion of the PROFESSIONAL to permit servicing of equipment, systems, etc.

3.2 INSTALLATION: (CLEANOUTS)

- A. Install cleanouts such that each type is flush with floor, walls, outside grade, etc. Except as explicitly noted, all inside floor cleanouts shall be flush with finished floor surface.
- B. Flush grade cleanouts shall include a concrete pad surrounding cleanout as indicated above concrete pad and cleanout top shall be flush with finished grade.
- C. All cleanout plug threaded sections to be installed with appropriate lubricant and sealant for future maintenance and access.
- D. The top and faceplate of all cleanouts indoors shall be cleaned and polished prior to final inspection by the PROFESSIONAL.

END OF SECTION

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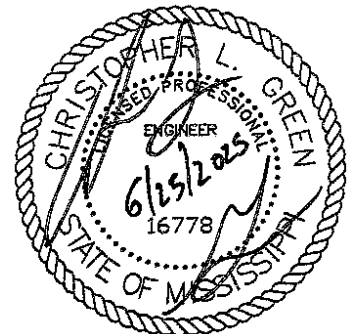
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SECTION 260511 - ELECTRICAL GENERAL

PART 1 – GENERAL

1.1 GENERAL

- A. All work shall conform to the latest editions of the National Electrical Code (NEC) [National Fire Protection Association (NFPA) 70], the Standard for Electrical Safety in the Workplace (NFPA 70E), the Life-Safety Code (NFPA 101), the International Building Code, the Americans with Disabilities Act, and all other applicable federal, state, and local codes and regulations.
- B. All work shall be performed in strict compliance with NFPA 70E. Submission of bid shall stand as an agreement by the Contractor to indemnify and hold harmless the Engineer and Owner from all liability related to damage and/or injury to personnel and equipment during the installation of the project.
- C. The contract documents are schematic in nature and are intended to convey the intent of the electrical work to be performed on this project. Provide all material, labor, equipment, etc., necessary to provide complete and operable electrical systems.
- D. The General Conditions, Supplementary Conditions, General Requirements, Information to Bidders, and all other parts of this set of Contract Documents are hereby adopted and are applicable to the Electrical Contractor.
- E. If we are required to make additional site visits due to the Contractor not meeting the project schedule, additional engineering fees will be invoiced to the Owner (via the Architect if applicable) at our standard hourly rates, along with expenses. The Owner will reduce his payments to the Contractor accordingly.

1.2 SCOPE OF WORK

- A. Visit site prior to bid. Devise a plan for installation of complete and operable electrical systems meeting the requirements and intent of the Contract Documents. Submission of Bid stands as evidence that the Contractor accepts the Contract Documents as sufficient and complete for the work to be performed. Notify the engineer at least two weeks prior to bid of any discrepancies between the Contract Documents and actual field conditions. No change orders will be granted due to existing conditions that could have been observed during a site visit.
- B. Provide temporary power and lighting during construction. Coordinate with the General Contractor for the exact requirements.
- C. Electrical switchgear and panelboard layouts are based on sizes of Square D equipment. Equipment manufactured by General Electric, Siemens, and Cutler Hammer are equally acceptable. However, the Electrical Contractor is responsible for selecting and furnishing gear that will fit in the spaces provided and shall be responsible for arranging the gear to meet the required code clearances. Regardless of the manufacturer, the Electrical Contractor shall

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provide a drawn-to-scale electrical layout with the equipment brochures for all rooms in which panelboards, motor control centers, switchboards, or switchgear are placed. The drawings shall include the work of all other trades including mechanical system piping, ductwork, sprinkler piping, etc. No conduits shall be installed until layouts have been approved.

- D. Locate junction boxes, pull boxes, disconnects, and other equipment requiring access in such a manner that they are accessible at the end of construction. Notify the Architect where it is impossible to plan conduit routing or equipment placement in such a manner, and provide the necessary access panels in the ceiling or wall as required. The access panel type and style shall be subject to the Architect's approval. Employ a painter to provide the appropriate coatings as directed by the Architect.
- E. Relocate, or recircuit, all electrical equipment, conduit, and circuitry conflicting with or obstructing work on this project. Where the electrical systems are owned by other entities, pay them to relocate, or recircuit, their facilities.
- F. Arrange for connection of service to all electrical systems by the appropriate utility company. Coordinate completely with all utility company requirements even if they are different than the contract documents. If utility company requirements are different from the contract documents, notify the engineer at least ten days prior to bid. **See the Allowance section of the specs for the utility allowance cost that shall be included in the bid price.**
- G. Provide all necessary equipment, raceway, circuitry, fittings, lugs, terminations, labor, etc. and connect to all equipment and appliances requiring electrical connections furnished herein, by the Owner, or by other Contractors. Prior to ordering electrical equipment and roughing in for equipment furnished herein, by the Owner, or by other Contractors, verify all connection types, connection locations, connection heights, voltages, number of phases, conductor sizes, disconnecting means, breaker sizes, etc. Furnish the proper electrical equipment for the equipment actually being supplied.

1.2 SCHEDULING OUTAGES

The Contractor is responsible for scheduling any required power, communications, fire alarm system, etc., outages to existing facilities with the Owner and/or other affected parties. The Contractor shall take steps as necessary to minimize the period of these outages including, but not limited to the following:

- Working multiple shifts as required;
- Increasing manpower as required;
- Providing temporary power and/or connections as required.

The cost of all such work, including premium work hours such as weekends and holidays, shall be included in the Contractor's bid price.

1.4 SUBMITTALS AND SHOP DRAWINGS

- A. Within 30 days after award of Contract and prior to beginning work, provide six bound copies of manufacturers' cut sheets containing information concerning each article of electrical equipment to be furnished on this project. These cut sheets shall contain sufficient information

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to prove compliance with the contract documents. Information addressing the requirements of the contract documents shall be highlighted. Each bound set shall bear the stamp of the Electrical Contractor as well as the General Contractor.

- B. Within 30 days after award of Contract and prior to beginning work, provide six sets of full-size shop drawings showing exact equipment locations with all equipment drawn to scale. Show all raceways with their junction boxes and pull boxes. Show all connection types, locations, and heights to equipment. Provide mounting and support details for all raceways and equipment. Coordinate with all other trades to ensure that there are no conflicts between systems. Each set of shop drawings shall bear the stamp of the Electrical Contractor, the General Contractor, and all Project Sub-Contractors. Failure to submit these Shop Drawings will render the Electrical Contractor responsible for resolving all conflicts between trades at his own expense.
- C. Submittals and Shop Drawings are reviewed to determine quality of materials. Approval of submittals and shop drawings does not relieve the Contractor of meeting the requirements and intent of the Contract Documents.
- D. Outlet, light fixture, and device locations are shown in their approximate locations on the drawings. Coordinate with Architectural drawings to get final locations. Mount all electrical outlets shown at counters such that the bottom of the box is two inches above the backsplash or six inches above a counter with no backsplash. The Owner reserves the right to relocate outlets, light fixtures, and devices a distance not to exceed twenty feet prior to the installation of outlet boxes.
- E. If we are required to reject submittals twice, our additional reviews will be invoiced to the Owner (via the Architect if applicable) at our standard hourly rates. The Owner will reduce his payments to the Contractor accordingly.

PART 2 - PRODUCTS

- 2.1 All electrical equipment and materials shall be new. All equipment and materials shall be stored on the job site in weatherproof enclosures. Electronic equipment shall be stored in facilities where the temperature and humidity are controlled. In addition, comply completely with all manufacturers' requirements for storage and handling.
- 2.2 All equipment shall be UL listed for the application in which it is used and shall be labeled as evidence of its UL listing.
- 2.3 All products of similar type shall be of the same manufacturer.
- 2.4 Each branch circuit and multiwire branch circuit shall be run with its own neutral conductor complying with NEC article 200.4.

PART 3 – EXECUTION

- 3.1 WORKMANSHIP

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All work shall be performed with an emphasis on neatness. The Engineer, Architect, and Owner retain the right to reject work that is, in their judgment, unsatisfactory.

3.2 EXPERIENCE

The Contractor shall have completed at least two jobs of similar size and scope within the past five years. The Engineer reserves the right to reject Contractors based on their inability to submit evidence of their experience, or based on experience with the Contractor on previous projects.

3.3 PERMITS

Obtain and pay for all permits required for work.

3.4 FIREPROOFING

- A. Fireproof all penetrations through firewalls with a fireproofing compound listed to maintain the rating of the wall through which the raceway passes.
- B. The firestopping caulk shall be a one-part, intumescent, latex elastomer. The caulk shall be capable of expanding a minimum of 3 times at 1000°F. The material shall be thixotropic and be applicable to overhead, vertical and horizontal firestops. The caulk shall be listed by independent test agencies such as UL or FM and be tested to, and pass the criteria of, ASTM E 814 Fire Test, tested under positive pressure. It shall comply with the requirements of the NEC (NFPA-70), BOCA, ICBO, SBCCI and NFPA Code 101. Firestopping caulk shall be paintable, but shall be non-hardening. Firestopping caulk shall be 3M Firebarrier CP or approved equal.
- C. The fireproofing materials shall be installed by individuals certified to perform such work. Submit evidence of personnel certifications with electrical equipment brochures.
- D. Where cable trays are shown crossing firewalls, terminate the cable tray on each side of the wall and run the conductors through conduits installed in the wall. Fireproof around the conductors after installation.
- E. Provide mineral wool packing and all other materials recommended by the manufacturer for a complete installation.

3.5 FLASHING

Provide all necessary equipment and flash all roof penetrations in such a manner to ensure that all penetrations are completely sealed and all roof warranties remain in effect. Where there are no roof warranties, the Electrical Contractor shall guarantee the electrical penetrations against leaking for a period of one year from project completion. Employ a professional roofing contractor to perform all flashing.

3.6 PROTECTION

- A. Keep energized equipment covered during all phases of construction. Use enclosures, doors, covers, etc., to ensure that neither personnel nor machinery contact live electrical equipment.

- B. Replace electrical equipment that is damaged during construction.

3.7 DAMAGED FACILITIES

Locate all existing site equipment and utilities prior to beginning construction. Repair all equipment and utilities damaged during construction, or pay for the repair of the equipment and utilities where required by the Owner of the damaged facilities.

3.8 EXCAVATION AND BACKFILL

- A. Excavate in such a manner as to minimize erosion of the soil. Backfill trenches around conduits with fine sand that is free of rocks, clods, and debris. Fill sand a minimum of 4" over conduits. Backfill the rest of the trench in six inch increments, wetted, and tamped. Final compaction shall be a minimum of 95% of that of the adjacent earth. Resurface the grade with the same material as that excavated from the grade whether it be paving, concrete, sod, etc. Repair work shall be comparable to the quality of the original site prior to excavation.
- B. Provide a 3" wide plastic labeled marker tape 12" below grade over all electrical conduits buried underground. Tapes for power circuits shall have a warning such as "Caution: Buried Electrical Line Below." Labels on tapes for telephone, data, cable television, and other facilities shall adequately describe the line over which they are buried.
- C. Provide a #12 AWG tracer wire in each buried conduit run labeled accordingly on each end.

3.9 IDENTIFICATION

- A. Label all switchboards, panelboards, motor starters, disconnects, and motor control centers furnished under Division 26 and other divisions of this contract with engraved rigid plastic nameplates having letters at least ¼ inch high. Nameplates shall be bolted to the enclosure. All labels shall indicate the voltage, number of phases, the AIC rating, and the panelboard and circuit number from which the device is fed.
- B. All circuit breakers in Switchboards, Motor Control Centers, Square D I-Line, and similar panelboards shall be labeled with plastic nameplates (as described in Part A) providing the name of the load served and the ampacity and number of poles of the breaker.
- C. All Square D NQOD, NF and similar panelboards shall have typewritten circuit directories.
- D. Label all conductors at all junction boxes, pull boxes, and terminations with typewritten adhesive markers indicating the panelboard or switchboard name and circuit number of the conductor. Labels shall be Brady Datab or approved equal.
- E. Label all junction boxes and pull boxes with stenciled painted letters containing the name of the panelboard and circuit numbers of the circuits contained within. Use black paint for normal circuits, red paint for emergency circuits, and orange paint for fire alarm circuits. The Contractor may select other colors for junction boxes and pull boxes for auxiliary systems.

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- F. Label all conduits in the most likely direction of access and view every 50' and on both ends of each bend with stenciled painted letters containing the name of the panelboard and circuit numbers of the circuits contained within. Use black paint for normal circuits, red paint for emergency circuits, and orange paint for fire alarm circuits. The Contractor may select other colors for conduits for auxiliary systems.

3.10 AS-BUILT DRAWINGS

Maintain one set of drawings during construction for as-built markings. Mark these drawings in red to indicate field changes. Provide these drawings to the Engineer at the end of the construction process. Where required under the General Conditions, Special Conditions, or other portions of this contract, provide revised computer drawn as-built drawings to the Engineer at the end of construction.

3.11 TESTING

- A. Test all systems, or pay testing agencies as required, for compliance with the requirements of all regulatory agencies.
- B. Test the electrical power service ground using a Biddle Three-Terminal Ground Resistance Tester, or approved equal. Grounds shall meet the requirements of the NEC, or of Specification 26 05 26, whichever is more stringent. Test grounds only when the earth is dry. Provide additional ground rods as necessary to achieve the required results.
- C. Prior to making final equipment connections, test all service, feeder, and branch circuit conductors for continuity, phase-to-phase faults, and phase-to-ground faults using a Megger BM100 or approved equal test instrument generating 500 Vdc. Insulation resistance shall be a minimum of 500,000 Ohms between any conductor and ground and 1,000,000 Ohms between any two conductors.
- D. Test other systems as required in their respective specifications.
- E. Provide three bound copies of all test results to the Engineer at the end of the construction process. No Recommendation of Substantial Completion will be granted until all testing reports have been submitted.

3.12 WARRANTY

Provide the Owner a written guarantee to repair, or replace, all faulty equipment and systems for a period of one year from date of Substantial Completion. During this one-year period, a representative of the Contractor shall be on the site actively working on the repairs within 24 hours of the Owner's telephone call. During this period of time, the Owner shall not be charged for any repair work or expenses related with the repair work unless the Contractor can prove that the Owner has damaged the equipment or system.

END OF SECTION

SECTION 260512 - WORK IN EXISTING FACILITIES

PART 1 – GENERAL

1.1 GENERAL

- A. All work shall be scheduled and coordinated through the General Contractor with the Owner. Provide necessary costs for all work during both normal and premium work hours in bid.
- B. Provide continuous uninterrupted power to all existing facilities to remain during the entire construction process. Any required power outages must be scheduled and approved by the Owner in writing at least three days prior to the outage.

1.2 SCOPE OF WORK

- A. Prior to beginning work, survey existing electrical systems. Document, in writing, signed by the Owner any portions of existing systems that are not operating properly before construction begins. Any electrical systems found inoperable at the end of the construction process that has not been so documented shall be repaired at the end of construction.
- B. Remove electrical equipment in areas being demolished, and electrical equipment feeding other equipment being demolished. Remove raceways and circuitry back to the panel of origination. Where raceways are installed in inaccessible areas, remove conductors back to the panel of origination. Where circuits are not being completely demolished, remove conductors back to a junction box or other connection point outside of the renovated area and recircuit existing electrical equipment that is to remain as required. Where necessary, completely refeed existing electrical equipment that is to remain. It is the intent of this specification that all existing equipment to remain be left completely operable at the end of the construction process.
- C. Survey existing panelboard circuitry and provide new typewritten directories giving complete as-built circuitry information for all panelboards affected by the construction on this project.
- D. Where new circuit breakers are installed in existing equipment, the new circuit breakers shall be manufactured for installation in that equipment. The Amperes Interrupting Current (AIC) Rating shall equal the AIC rating of the existing equipment. A breaker with a lower AIC rating may be used if the contractor provides calculations showing that the breaker rating is sufficient to handle the available fault current. Submit these calculations for approval prior to ordering the breaker. An AIC rating on an existing breaker in the panelboard or switchboard does not demonstrate sufficient proof that the available fault current is less than that breaker's AIC rating.

PART 2 – PRODUCTS

- 2.1 Products shall be selected to maintain or improve the aesthetics of the facility. Gain approval of the Architect or Engineer prior to ordering or installing any electrical equipment or raceway.

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PART 3 – EXECUTION

- 3.1 Coordinate the routing of all circuits and the locations of all devices with the Architect or Engineer and the Owner. Shop drawings shall describe completely the locations and elevations of all raceways, boxes, fittings, and equipment.
- 3.2 Where conduits and circuitry are shown concealed in existing walls, ceiling, or floors, employ professional tradesmen to perform cutting, patching, painting, and any other type of finishing required to match the surrounding surfaces. Submit the selected professional's qualifications to the Architect or Engineer for approval prior to beginning work.

END OF SECTION

SECTION 260519 - 600V CONDUCTORS

PART 1 – GENERAL

Provide all circuitry, terminations, splices, connectors, lugs, and other equipment necessary for connection of all equipment requiring electrical connections.

PART 2 – PRODUCTS

- 2.1 All electrical conductors shall be soft-drawn annealed copper having 98% conductivity and an insulation rating of 600V.
- 2.2 Conductors shall be UL listed for installation in the raceway in which they are to be installed.
- 2.3 Conductors shall be rated 90 degrees C for use in residential, commercial, industrial, and institutional facilities, and shall be listed as 105 degrees C appliance wire. Conductors shall be listed under UL 83, UL 1063, and UL 758. If XLP or EPR insulation is used, conductors shall be listed under UL 44 and NEMA WC7.
- 2.4 Conductors used for branch circuits, feeders, auxiliary systems, and controls run in dry locations shall have PVC insulation and a Nylon outer jacket. They shall be THHN/THWN or XHHW-2.
- 2.5 Conductors used for branch circuits, feeders, auxiliary systems, and controls run in wet locations shall have XLP or EPR insulation and be type XHHW-2.
- 2.6 Conductors used for operating room isolation panels and associated branch circuits shall be copper stranded conductor having a cross-linked polyethylene insulation or equivalent with a dielectric constant of 3.5 or less. Wire-pulling compounds that increase the dielectric constant shall not be used on the secondary conductors of isolation panels. The isolated circuit conductors shall be identified as follows:

Isolated Circuit #1 – Orange
Isolated Circuit #2 – Brown

For 125 volt, 15 & 20 ampere receptacles: The orange conductor shall be connected to the terminal on the receptacle that is identified in accordance with NEC 200.10(B) for connection to the grounded circuit conductor.

- 2.7 Conductors used for services shall be type SE for aerial services or type USE-2 for underground services.
- 2.8 All conductors shall be stranded. Use ring tongue terminals or spade lugs for connections to terminal screws.
- 2.9 Use minimum #14 AWG conductors for controls and auxiliary circuits. Use larger conductors as required to compensate for voltage drops exceeding 3% of the system voltage.
- 2.10 Conductors shall be furnished in the colors described below unless local ordinances require different colors. Conductors #8 and smaller shall be furnished with colored insulation; conductors

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larger than #8 shall be taped with the appropriately colored tape for a length of at least 2” at each panelboard, junction box, pull box, load, or other exposed location. Ground conductors shall be taped green for their entire exposed length.

System Voltage	208Y/120V, 3-Phase, 4-Wire	120/240V, 3-Phase, 4-Wire	480Y/277V, 3-Phase, 4-Wire
Phase A	Black	Black	Brown
Phase B	Red	Orange	Orange
Phase C	Blue	Blue	Yellow
Neutral	White	White	Gray
Ground	Green	Green	Green

2.11 Conductor sizing chart:

Voltage Drop Chart for 20amp single pole circuits		
Voltage	Circuit Length	Conductor size (awg)
120	< 90'	#12
120	> 90'	#10
120	> 145'	#8
120	> 230'	#6
277	< 200'	#12
277	> 200'	#10
277	> 325'	#8
277	> 525'	#6

- A. Circuit sizes indicated on the drawings are minimum NEC requirements. Refer to this chart for upsizing conductors based on circuit length.
- B. Do not connect conductors larger than #10 directly to a receptacle or a switch. Provide a junction box to downsize the conductor to #12 at the device.
- C. For circuits longer than those listed above, consult with the Engineer for conductor sizes.

PART 3 – EXECUTION

- 3.1 Install conductors carefully using a minimum of two tradesmen – one feeding the conductors into the conduit, and the other pulling the conductors into the conduit.
- 3.2 **Each branch circuit and multiwire branch circuit shall be run with its own neutral conductor complying with NEC article 200.4.**
- 3.3 Join stranded conductors with appropriate mechanical or compression lugs. Wire nuts may be used for solid conductors only.

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- 3.4 Splices shall only be made in approved enclosures. Splices shall not be pulled inside conduits.
- 3.5 Provide cable supports and strain relief connectors as required by the NEC.
- 3.6 Furnish junction boxes, pull boxes, handholes, manholes, etc. as required to ensure that the maximum number of bends allowed by the NEC are not exceeded and to ensure that the cables are not damaged during installation.

END OF SECTION

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 GENERAL

Ground all equipment, systems, structures, etc., per the latest edition of the National Electrical Code (NEC).

PART 2 – PRODUCTS

- 2.1 Use mechanical bolted connections in dry locations that are accessible.
- 2.2 Use exothermic welds in wet locations and locations that will be inaccessible at the end of construction.
- 2.3 Ground rods shall be UL listed 3/4" x 10' copper-clad steel ground rods with a minimum copper cladding thickness of 10 mils.

PART 3 – EXECUTION

- 3.1 Ground rods shall be installed with their tops no less than 6" below grade.
- 3.2 Bond ground connections to metal raceways at each end of the conduit run. Provide grounding bushings where required by the NEC. Where cable trays are used, bond the ground conductor to each section and fitting of the tray.
- 3.3 Provide all circuits with an equipment grounding conductor sized per the NEC, or as shown on the drawings. Circuitry shown on drawings does not include the required equipment grounding conductor. Where multiple circuits are run with a common neutral, only one equipment grounding conductor is needed. The equipment grounding conductor shall be furnished with green insulation for conductors #8 AWG and smaller; where larger than #8, the equipment grounding conductor shall be taped green for its entire exposed length.
- 3.4 The grounding electrode conductor(s) shall be bare or shall be colored green for its entire exposed length.
- 3.5 Individual ground conductors shall be installed in PVC conduit sized per the NEC.
- 3.6 Provide receptacles, luminaires, and other devices with a green conductor that bonds the receptacle grounding screw or pigtail, the outlet box grounding screw, and the equipment grounding conductor together.
- 3.7 In health care facilities, where two or more different panel boards serve the same patient-care area, an 8 AWG insulated continuous copper conductor shall bond these different panel boards together.
- 3.8 Telephone, cable television, and other auxiliary systems shall be bonded to the electrical building service ground using a conductor no smaller than #6 AWG.

END OF SECTION

SECTION 260533 - RACEWAYS

PART 1 – GENERAL

1.1 GENERAL

All electrical systems circuitry shall be contained in raceways unless expressly listed in the specification for that system.

1.2 SCOPE OF WORK

- A. Provide all raceways, fittings, couplings, anchors, supports, hangers, etc. for complete raceway systems.
- B. Size all conduits per the requirements of the NEC; however, minimum conduit size shall be $\frac{3}{4}$ " nominal trade size.
- C. Use Schedule 40 polyvinyl chloride (PVC) conduit for circuits run underground. Provide PVC-coated galvanized rigid steel elbows and PVC-coated galvanized rigid steel conduit for all vertical runs extending to a point at least 6" above grade. Galvanized Rigid steel conduit coated with two complete coats of asphaltum or bituminous paint may be used in lieu of PVC-coated galvanized rigid steel conduit.
- D. Use Galvanized Rigid Steel (GRS) conduit for all applications where circuits are run above ground exposed to the weather.
- E. Use Intermediate Metal Conduit (IMC) for all branch circuits, feeders, and auxiliary circuits requiring conduit 1 $\frac{1}{4}$ " nominal trade size or larger in dry locations.
- F. Use Electrical Metallic Tubing (EMT) for all branch circuits and feeders less than 1 $\frac{1}{4}$ " nominal trade size in dry locations and in slabs above grade level.

PART 2 – PRODUCTS

- 2.1 PVC conduits, fittings, couplings, adapters, and accessories shall be UL listed and approved for use with 90 degree Celsius conductors. The UL label shall be affixed to each ten foot length of conduit and each fitting. Conduits shall comply with NEMA Specification TC-2 and UL 651. Fittings shall comply with NEMA TC-3 and UL 514b.
- 2.2 PVC-coated conduits, fittings, couplings, adapters, and accessories shall be UL listed with PVC as the primary corrosion protection. They shall be hot dipped galvanized rigid steel conduit with threads electro-galvanized after cutting. The conduit shall meet UL 6. The fittings shall meet UL 514B. The PVC coating shall be uniformly applied to the interior and exterior of all conduit and fittings. The coating shall be nominally 2 mils thick. The PVC coating shall extend one pipe diameter or two inches, whichever is less, at every male fitting except unions to fit over the joining female connection. Couplings shall contain a series of longitudinal ribs, 40 mils in thickness, to protect the coating from

damage by tools during installation. PVC-coated conduits shall be ETL Verified PVC-001. Fittings shall be manufactured to the same standard. PVC-coated conduit shall be Robroy Plastibond or approved equal.

- 2.3 GRS conduits, fittings, couplings, adapters, and accessories shall be UL listed. They shall be hot-dipped galvanized steel. They shall meet the safety standards of UL 6, and shall be manufactured to ANSI C80.1. Threads shall be hot galvanized after cutting.
- 2.4 IMC conduits, fittings, couplings, adapters, and accessories shall be UL listed. They shall be hot-galvanized steel. Fittings, couplings, adapters, and accessories shall be the same as those for GRS conduit described above. IMC shall meet UL 1242 and ANSI C80.6. Threads shall be hot galvanized after cutting. The inside of the conduit shall be finished with a corrosion-resistant coating.
- 2.5 EMT conduits, fittings, couplings, adapters, and accessories shall be UL listed. They shall be hot galvanized steel and shall be produced in accordance with UL 797 and ANSI C80.3. The inside shall be finished with a corrosion-resistant lubricating coating.
- 2.6 Conduit fittings used with EMT conduits may be set screw indenter type or compression type. All metallic fittings for IMC and Rigid conduit shall be threaded type fittings.
- 2.7 Flexible metallic conduit shall be constructed of galvanized steel and shall be UL listed as compliant with UL 1 and UL 1479.
- 2.8 Liquidtight flexible conduit shall be constructed of galvanized steel and shall be coated with a PVC jacket to resist liquids, dirt, grease, and oils. All fittings shall be designed, constructed, and installed to maintain the integrity of the liquidtight connections. Liquidtight flexible conduit shall comply with UL 360.

PART 3 – EXECUTION

- 3.1 All conduits are to be run concealed in ceilings or walls unless specifically shown otherwise, or unless written permission is obtained from the Architect or Engineer to run them exposed in a certain location where field conditions prohibit their concealment.
- 3.2 Conduits run underground shall be buried no less than 24” deep. Services, conduits for primary conductors, and conduits run under roadways shall be buried no less than 48” deep.
- 3.3 **Do not install conduits in or below ground floor slabs, except for service conduits, site lighting, and where specifically indicated on the drawings. All ground floor conduits shown underground where there are concrete slabs shall be run in the ground below the aggregate trenched and backfilled with select fill that is free of rocks, clods, and debris.**
- 3.4 **No conduits shall be run in the slabs on any level unless specifically shown on the drawings to be routed in that manner, and then permission must be obtained in writing from the structural engineer describing where it is permissible to route the conduits.**

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- 3.5 Do not install conduits within 6" of the deck where a screw down type roof system is utilized.
- 3.6 PVC-coated conduits may be field-bent provided that manufacturer-approved tools are used. Individuals installing PVC-coated conduits shall be trained for installation by factory-certified trainers. Provide evidence of training with equipment brochures.
- 3.7 Support and install all conduits per the latest edition of the National Electrical Code. Support groups of conduits with electrical strut supported by threaded rods anchored to the building structure. Supports shall be designed to hold no less than twice the weight of the conduit and conductors to be supported plus an additional 250 pounds at midspan.
- 3.8 All conduits shall be grouped and run parallel to each other and to building walls.
- 3.9 All conduits shall be assembled according to the manufacturer's instructions.
- 3.10 Conduits run underground shall be assembled to be watertight.
- 3.11 Cap all conduits during installation. Pull a mandrel sized for that conduit and a cleaning brush through each conduit before installation of any conductors.
- 3.12 Conduits that are obviously damaged and field bends that are obviously out of round shall be replaced.
- 3.13 Provide final connections to equipment with flexible metallic conduit. In wet or damp locations, use liquidtight flexible metallic conduit. Flexible conduit connections to equipment shall be no longer than 72".
- 3.14 Terminate all 1" and smaller conduits entering boxes with a locknut inside the box and a locknut outside the box. Provide protective bushings on all 1" and smaller conduit threads. Use watertight hubs where conduit terminations are exposed to moisture.
- 3.15 Use grounding bushings on all connections of 1-1/4" and larger conduits into outlet boxes, junction boxes, metallic enclosures, and panelboards. Grounding bushings shall also be used on all underground conduits and elsewhere required by the National Electrical Code.
- 3.16 Conduits shall be run no closer than 12" to hot water pipes.
- 3.17 Where conduits are run through the ceiling and are required to make connections to equipment within the room that is not located near a wall, support the conduit from the structural ceiling and provide a flange bolted to the floor. Install a tee conduit fitting in the vertical run of conduit, and make the connection to the equipment with a piece of flexible conduit extending from the tee conduit fitting to the equipment.
- 3.18 Provide expansion fittings where conduits cross building expansion joints. Provide grounding jumpers between the conduits.
- 3.19 Provide EMT conduit sleeves where conduits pass through walls, floors, or footings sized a minimum of two nominal trade sizes larger than the conduit that must pass through the sleeve.

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3.18 Equip all empty conduits with a pullwire or string capable of withstanding 500 pounds of pulling tension.

END OF SECTION

SECTION 260534 - OUTLET BOXES AND JUNCTION BOXES

PART 1 – GENERAL

- 1.1 Furnish and install all outlet boxes and junction boxes in accordance with this specification and the requirements of the NEC.
- 1.2 Provide outlet boxes for all switches, receptacles, luminaires, telephone jacks, cable jacks, and other devices furnished in this Contract. Provide all necessary hardware including, but not limited to, additional structural support, support brackets, screws, bolts, fixture studs, etc.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

Outlet boxes and junction boxes shall be manufactured by Raco, Steel City, Crouse Hinds, or Appleton.

2.2 GENERAL

- A. Concealed Outlet boxes and junction boxes in dry locations shall be galvanized stamped steel boxes sized per the latest edition of the National Electrical Code (NEC), but no less than 4" x 4" x 2 1/8" deep. The thickness of the steel shall be in compliance with the requirements of the NEC. Provide stamped steel covers for all junction boxes manufactured to fit the particular box on which it is used. **Note: Do not use stamped steel outlet boxes in exposed locations.**
- B. Exposed Outlet boxes in dry locations shall be heavy duty, deep, die cast aluminum device boxes (Perfect Line "T" or "LT" series or approved equal) with appropriate coverplates.
- C. Outlet boxes used in concrete and masonry walls and ceilings shall be of the concrete type manufactured for such applications.
- D. Outlet boxes and junction boxes in wet locations shall be of cast metal construction with gasketed waterproof covers. All conduit connections to the boxes shall be made watertight.
- E. Wall outlet boxes shall be 4" x 4" x 2 1/8", or larger as required, with plaster rings provided for final flush installation. Plaster rings shall have single-gang openings unless the equipment mounted inside requires two-gang installation.
- F. Floor boxes in slabs on grade shall be deep rectangular, cast iron, fully adjustable boxes with brass rings. Covers shall be made of brass and shall provide flip top access to the power or data jacks inside. Screw-on covers are not acceptable unless a flip-top cover is unavailable for the device installed in the floor box. Provide the box sized as required for the number of devices shown installed. Boxes shall be as follows, or approved equal:
 1. Single-Gang Boxes: Hubbell B2436
 2. Single-Gang Cover Plates: Hubbell S3825
 3. Double-Gang Boxes: Hubbell B4233
 4. Double-Gang Cover Plates: Two Hubbell S3825 Cover Plates

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5. Triple-Gang Boxes: Hubbell B4333
6. Triple-Gang Cover Plates: Three Hubbell S3825 Cover Plates

In slabs above grade, use cast iron, semi-adjustable shallow boxes as follows, or approved equal:

1. Single-Gang Boxes: Hubbell B2414
2. Two-Gang Boxes: Hubbell B4214
3. Three-Gang Boxes: Hubbell B4314

Receptacles installed in floor boxes shall be as described in Specification 16460, Switches and Receptacles. Data, Telephone, or Combination Data and Telephone Outlets shall consist of Category 5 rated RJ45 jacks mounted in a Hubbell DJOI strap for use under a S3825 flip top cover plate.

In existing slabs above grade, use poke thru boxes as follows, or equal:

1. Hubbell System One

G. Size all boxes per the requirements of the latest NEC.

PART 3 – EXECUTION

- 3.1 All devices shall be flush mounted unless specific written permission is obtained from the Engineer for a particular device in a particular location.
- 3.2 Install outlet boxes in walls, and provide plaster rings such that wall finish contractor's finish is flush against the edge of the plaster ring. Workmanship will not be accepted where the hole in the wall shows behind the cover plate, or the wall finish is uneven or unpainted at the edge of the cover plate.
- 3.3 Use round or square ceiling outlet boxes as required for the device being installed. The ceiling shall be finished flush against the box; the fixture shall completely cover the box and mount tight against the ceiling. Coordinate the requirements of the fixture prior to installing the box.
- 3.4 Provide junction boxes, pull boxes, and conduit fittings where required by the NEC to limit the number of bends in the raceway, and where required to prevent damage to conductors due to long runs.
- 3.5 Junction boxes and pull boxes installed in the ground outside shall be Quazite Composolite or approved equal. Mount the boxes over 24" of washed gravel fill. If splices are to be made inside the boxes, the boxes shall be of the type furnished with a bottom, and all conduit connections shall be watertight. In addition, all conductor splices shall be made watertight using an appropriate splice kit as manufactured by 3M, or an approved equal.

END OF SECTION

SECTION 260573 - ELECTRICAL STUDIES

PART 1 – GENERAL

- 1.1 The Electrical Studies in this specification shall be performed by the electrical gear Manufacturer. The Electrical Studies shall be preliminarily performed at the electrical gear submittal time and then updated when all of the electrical gear is installed and the exact electrical parameters are known.
- 1.2 The purpose of the preliminary study (Fault Current Study) is to verify that the electrical gear is specified with the correct AIC ratings for the facilities' power system. The initial study shall be conducted using the electrical gear specified in the construction documents. The Single Line Diagram in the construction drawings shall be used for circuitry sizes of the major electrical gear. The Power, Mechanical, and Equipment Plans in the construction drawings shall be used for circuitry sizes of the remaining electrical gear. The Utility transformer shall be modeled using "worst case" parameters for impedance and infinite short circuit current available at the primary of the transformer. Dry type transformers shall be modeled using typical impedances for the size of transformer specified. Emergency generators shall be modeled using "worst case" parameters for sub-transient reactance and a typical decrement curve for the kW size of generator specified utilizing a permanent magnet alternator. The Electrical Contractor shall assist the electrical gear Manufacturer's Engineer with estimated circuitry lengths. The studies shall be run, evaluated, and then submitted along with the electrical gear submittals. The equipment AIC ratings on the Drawings and in the Specifications represent the minimum acceptable ratings. Higher rated equipment shall be provided as necessary, based on study results. Electrical gear submittals will not be approved without the results of this study. **However, if the gear is submitted and approved without the study in order to expedite shipping, the Contractor shall be liable for any changes to the system, including, but not limited to equipment replacement due to the results of the study.** An electronic copy of the power system model shall be saved by the electrical gear Manufacturer's Engineer.
- 1.3 After all of the electrical gear is installed and the exact electrical parameters of the project are known, the Electrical Contractor shall give that information to the electrical gear Manufacturer's Engineer. The saved power system model shall be updated with the exact utility X/R ratios (three phase and phase-to-ground), utility primary voltage over-current protection devices, transformer impedances, circuitry sizes, circuitry lengths, generator sub-transient reactance, and generator overload curves. The purpose of updating the preliminary power system model is to provide accurate information for Arc Flash Labels, Available Fault Current Labels, and Protective Device Settings. A Fault Current Study, a Protective Device Coordination Study, and an Arc Flash Study shall be run, evaluated, and then submitted to the electrical engineer for approval. The approved study report shall be used for setting the Protective Devices, producing Arc Flash Labels, and producing Available Fault Current Labels.

PART 2 – ELECTRICAL STUDIES PERFORMED

2.1 PROTECTIVE DEVICE COORDINATION AND ARC FLASH STUDIES

- A. The Contractor shall employ the equipment Manufacturer's Engineers to perform the Protective Device Coordination and Arc Flash studies. The Engineer responsible for the study shall perform such work as his job responsibility, and shall have performed at least 100 such studies in his career. Submit the Engineer's credentials with the study results.

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- B. Analyses shall be prepared to demonstrate that the equipment and system to be provided meet the specified requirements for equipment ratings, coordination, and protection. They shall include a fault current analysis and protective device coordination study.
- C. Scope of Analyses. The Fault Current Analysis, Protective Device Coordination, and Arc Flash Studies shall include all electrical equipment where the incident energy level is greater than 1.2 Cal/cm^2 . The term electrical gear shall include the following: Transformers (Utility & Dry Type), Switchboards, Panelboards, Motor Control Centers, Disconnects, Loadcenters, Enclosed Circuit Breakers, Motor Starters, Contactors, etc.
- D. Determination of Facts. The time-current characteristics, features, and nameplate data for each existing protective device shall be determined and documented. The Contractor shall coordinate with the commercial power company for three phase and single phase fault current availability and X/R ratios at the site.
- E. Single-Line Diagram. Provide a single-line diagram to show the electrical system buses, devices, transformation points, and all sources of fault current (including generator and motor contributions). A fault-impedance diagram or a computer analysis diagram shall be provided. Each bus, device or transformation point shall have a unique identifier. If a fault-impedance diagram is provided, impedance data shall be shown. Locations of switches, breakers, and circuit interrupting devices shall be shown on the diagram, together with available fault data, and the device interrupting rating.
- F. Arc Flash Hazard Analysis:
 - 1. Method. The Arc Flash Hazard analysis shall be performed in accordance with the latest applicable NFPA 70E, OSHA 29-CFR, Part 1910 Sub part S, IEEE 1584, and NESC Standards. The study must be performed using IEEE 1584 for equipment rated 50 to 15kV and NESC for equipment rated above 15kV. **The use of NFPA 70E Task Tables to determine Hazard Classification is not acceptable.**
 - 2. Data. The analysis shall consider all operating scenarios during normal conditions, alternate operations, emergency power conditions, and any other operations, which could result in maximum Arc Flash Hazard. The label shall list the maximum incidental energy calculated and the scenario. Possible scenarios include, but are not limited to: Normal Utility Power, Emergency Generator Power, Bus Tie Breaker Open, Bus Tie Breaker Closed, UPS Power, etc..
- G. Fault Current Analysis:
 - 1. Method. The fault current analysis shall be performed in accordance with methods described in IEEE Std 242, and IEEE Std 399.
 - 2. Data. Actual data shall be utilized in final fault calculations. Bus characteristics and transformer impedances shall be those proposed for the initial analysis. Data shall be documented in the report.
- G. Fault Current Availability. Balanced three-phase fault, bolted line-to-line fault, and line-to-ground fault current values shall be provided at each voltage transformation point and at each

- power distribution bus. This data shall be shown in tabular form on the diagram or in the report.
- H. Coordination Study. The study shall demonstrate that the maximum possible degree of selectivity has been obtained between all electrical equipment, consistent with protection of equipment and conductors from damage from overloads and fault conditions. The study shall include a description of the coordination of the protective devices in this project. Provide a written narrative that describes: which devices may operate in the event of a fault at each bus; the logic used to arrive at device ratings and settings; any situations where system coordination is not achievable due to device limitations (an analysis of any device curves which overlap); coordination between upstream and downstream devices; and settings. Provide recommendations to improve or enhance system reliability and detail where such changes would involve additions or modifications to the Contract. Cost changes (addition or reduction) shall be provided. Composite coordination plots shall be provided on log-log graph paper.
- I. Study Reports (Initial and Final)
1. The reports shall include a narrative: the analyses performed; the bases and methods used; and the desired method of coordinated protection of the power system.
 2. The reports shall include descriptive and technical data for existing devices and new protective devices proposed. The data shall include Manufacturer's published data, nameplate data, and definition of the fixed or adjustable features of the existing or new protective devices.
 3. The reports shall document utility company data including system voltages, fault MVA, system three phase X/R ratio and magnitude, system single line to ground X/R ratio and magnitude, time-current characteristic curves, current transformer ratios, relay device curves, and protective device ratings & settings.
 4. The reports shall contain fully coordinated composite time-current characteristic curves for each bus in the system as required to ensure coordinated power system protection between protective devices or equipment. The report shall include recommended devices or equipment. The report shall include recommended ratings and settings of all protective devices in tabulated form.
 5. The reports shall provide the calculations performed for the analyses including computer analysis programs utilized. The name of the software package, developer, and version number shall be provided.

PART 3 – LABELS

- 3.1 The Electrical Gear Manufacturer shall print Arc Flash Labels for all electrical gear [Switchboards, Panelboards, Transformers (all except Utility), Motor Control Centers, Disconnects, Loadcenters, Enclosed Circuit Breakers, Motor Starters, Contactors, etc.] complying with the label detail in the construction drawings. The labels shall be of a type and quality to last in the environment in which they are installed. The labels shall be furnished to the Electrical Contractor for installation.

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- 3.2 The Electrical Contractor shall make the Available Fault Current Labels complying with the label detail in the construction drawings for each piece of electrical gear. The Protective Device Coordination Study report shall be used for providing the Available Fault Current at each location. The labels shall comply with NEC Article 110.24 of the 2011 edition. Available Fault Current labels shall be of a type and quality to last in the environment in which they are installed. The labels shall be mounted according to the label detail in the construction drawings.

END OF SECTION

SECTION 260923 - SWITCHES AND RECEPTACLES

PART 1 – GENERAL

Furnish and install all switches and receptacles in accordance with this specification and the requirements of the NEC.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

Switches and receptacles shall be manufactured by Hubbell, Cooper Wiring Devices, Leviton, or Pass & Seymour.

2.2 GENERAL

- A. Switches and receptacles shall be specification grade. They shall have ampacity and voltage ratings suitable for the application in which they are used.
- B. Consult architect or engineer for device colors prior to ordering devices.
- C. Provide brushed stainless steel cover plates for all devices. A single cover plate shall cover all devices in one box.
- D. Light switches shall be 20 Ampere, 120-277V back-wired and side-wired toggle switches. They shall be rated up to 2 HP at 240V. Each switch shall be equipped with a grounding screw. Switches shall be Hubbell CSB series or approved equal.
- E. Duplex NEMA 5-20R receptacles shall be Hubbell HBL 5362A or approved equal.
- F. Duplex GFI NEMA 5-20R receptacles shall be Hubbell HBL GF5362A or approved equal.
- G. Weatherproof while-in-use cover plates shall be Teddico #34017-7 or approved equal. Cover plates shall be single gang, lockable, and constructed of heavy duty die cast metal.
- H. All 125V, 15 and 20 ampere receptacles installed in dwelling units shall be of the tamper-resistant type.
- I. All 15 and 20 ampere, 125 and 250V non-locking receptacles installed in wet or damp locations shall be listed as the weather-resistant type.
- J. Devices furnished in this Contract, but not listed above, shall be of the same standard of quality as those items listed.

PART 3 – EXECUTION

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- 3.1 Flush mount all devices unless specific written permission is obtained from the Engineer for a particular device in a particular location.
- 3.2 Install all devices vertically unless the drawings specifically state that the particular device should be mounted horizontally.
- 3.3 Install receptacles with the ground slot up.

END OF SECTION

SECTION 260926 - VACANCY SENSORS

PART 1 - GENERAL

- 1.1 Furnish and install a complete system of Vacancy sensors as shown on the drawings and as specified herein to comply with IECC 2012. The drawings are provided to show the general scope of the work, and show the absolute minimum components required. Actual system components, quantities, and locations shall be determined by the motion detector vendor and provided to the Contractor with the installation shop drawings.
- 1.2 The Contractor and Sales Representatives are advised to take notice of specified component characteristics when attempting to select and propose substitutions. It is highly unlikely that substitutions on a one-for-one component basis will produce results that provide acceptable system performance.
- 1.3 Provide all power packs, hardware, software, devices, circuitry, and other components, material, and labor required to install, configure, and test the entire system to the satisfaction of the Architect, Owner, and Engineer.
- 1.4 Submit six sets of manufacturer's cut sheets describing completely all equipment, and six sets of shop drawings showing all circuitry including terminal-to-terminal connections.
- 1.5 The wiring diagrams on these drawings are based on our best interpretation of the manufacturer's data that was available at the time of design; however, they shall not be used for system installation and configuration. The controls equipment vendor is expected to be thoroughly knowledgeable of the equipment that is being proposed, and shall provide detailed shop drawings tailored for each circuit and lighting zone on the project. General manufacturer's data sheets shall not be acceptable. The shop drawings shall be suitable for the installing electrician to use for complete installation of the circuitry without referring to data sheets or installation manuals for connection of lighting control equipment. These requirements shall be followed whether the specified equipment, or products of other manufacturers, is provided.

PART 2 - PRODUCTS

- 2.1 Hallway Vacancy sensors: Vacancy sensors used in the hallways shall be passive infrared, ceiling-mounted units with a coverage of 6' x 130'. They shall be Sensor Switch HW13 WV BR or approved equal.
- 2.2 Wall mounted LED lighting controls shall be 0-10V dimmer/vacancy sensor type equal to Lutron MS-Z101-V-XX
- 2.3 Wall mounted lighting controls shall be dual technology (ultrasonice/passive infrared) dual relay vacancy sensor type equal to Lutron MS-B202-V-XX
- 2.4 Areas up to 500 Square Feet: Ceiling mounted Vacancy sensors used in areas up to 500 square feet shall be dual technology infrared and passive infrared, ceiling-mounted units with a 360 degree, 500 square foot coverage.
- 2.5 Power Packs: Power packs shall be of the same manufacturer as the Vacancy sensors. Each shall be

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capable of controlling a 20 Ampere circuit. They shall be rated for operation at the voltage of the system on which they will be used.

- 2.6 Circuitry: Provide control circuitry as required by the manufacturer for optimum system operation, but no less than the following: Control cables shall be 3-conductor #22 AWG copper with an overall jacket. Adjust conductor sizes as required to overcome unacceptable voltage drop. **Low voltage cabling shall be plenum-rated.**

PART 3 - EXECUTION

- 3.1 Vacancy sensors shall be provided so that their coverage areas overlap and there are no dead zones in the rooms where persons may stand and not be detected.
- 3.2 Vacancy Sensors shall be set for “manual on/automatic off” operation.
- 3.3 All work shall be done by qualified system technicians.
- 3.4 Wiring, including control wiring, shall be in Raceways meeting Specification 260533.
- 3.5 Guarantee workmanship and material for a period of one year after final acceptance. During the warranty period, repair or replace faulty equipment at no cost to the Owner for labor, material, or expenses.
- 3.6 Upon completion of job, test entire system. After testing submit a certificate to the Architect stating verification of the following:

PART 4 – CLOSE-OUT DOCUMENTS

- 4.1 Provide the following documents to the Architect for delivery to the Owner at the time of substantial completion:
- A. Written Guarantee
 - B. Two sets of data prepared by the manufacturer for each item of electrical equipment completely describing each piece of equipment. The data shall include parts lists, a description of operation, shop drawings, wiring diagrams, maintenance procedures, and other literature required for operation and maintenance of equipment.
- 4.2 Instruct the Owner on system operational procedures. Notify the Owner and Architect at least one week in advance of the training session. Provide written step-by-step instructional material.
- 4.3 Notify the General Contractor that you are to present during the Pre-final Inspection. During that inspection, demonstrate all system functionality and capabilities; remove cover plates and panels covers as required to show the quality of the installation. The Owner, Architect, and Engineer reserve the right to reject unsuitable workmanship or performance.

END OF SECTION

SECTION 262400 - PANELBOARDS

PART 1 – GENERAL

- 1.1 Furnish and install all panelboards, complete with their circuit breakers, phase buses, neutral buses, ground buses, structural supports, and other equipment necessary for complete systems.
- 1.2 The equipment vendor shall perform all calculations necessary and provide complete Arc Flash Labels as required by the National Electrical Cod (NEC) and the drawings. Note: The drawings typically require more detail than required by the NEC.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Panelboards shall be designed, manufactured, and tested to be in compliance with NEMA PB 1, UL 50, UL 67, UL 489, NFPA 70, and the ASTM.
- B. Circuit breakers shall be designed, manufactured, and tested to be in compliance with NEMA AB 1, UL 489, and Federal Specification W-C-375B/GEN.
- C. Panelboards shall be UL listed for service entrance where used for that purpose.
- D. Panelboard ampere interrupting current (AIC) ratings shall equal the lowest rated device in the panelboard. Provide panelboards with the AIC ratings shown on the Contract Drawings. Buses shall be braced to withstand the AIC rating shown on the drawings. Series ratings shall only be used where shown on the panelboard schedules.
- E. All panelboards shall be furnished with dead-front, door-in-door construction.
- F. Lug locations shall be determined during the creation of shop drawings for proper arrangement with the raceway system.
- G. Buses shall be constructed of 98% conductivity copper or equivalently rated aluminum.
- H. Panelboard enclosures shall be NEMA 1 when they are to be mounted indoors, and NEMA 3R when they are to be mounted outdoors. Provide special enclosures where shown on the Contract Drawings.

2.2 ACCEPTABLE MANUFACTURERS

Panelboards shall be manufactured by Siemens, Square D, General Electric, or Cutler Hammer.

2.3 PANELBOARD CLASSES

- A. Power distribution panelboards shall be available with mains and branch devices up to 1200 amperes. AIC ratings shall be available up to 200,000 Amperes. Power distribution panelboards

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shall be equipped with a nameplate containing the appropriate system voltage, number of wires, and number of phases for the system on which they are installed.

- B. In 480Vac and less applications where a main breaker not exceeding 600 Amperes is required, the AIC rating does not exceed 65,000 Amperes, and no branch breakers exceed 125Amperes, Square D NF and equivalent panelboards may be used.
- C. In 480Vac and less applications where a main breaker not exceeding 225 Amperes is required, the AIC rating does not exceed 14,000 Amperes, and no branch breakers exceed 100Amperes, Square D NEHB and equivalent panelboards may be used.
- D. In 240Vac and less applications where a main breaker not exceeding 400 Amperes or main lugs not exceeding 600 Amperes is required, the AIC rating does not exceed 22,000 Amperes, and no branch breakers exceed 125 Amperes, Square D NQ and equivalent panelboards may be used. Loadcenters shall not be acceptable!

2.4 CIRCUIT BREAKERS

- A. Circuit breakers shall be of the bolt-on type (except for those used in ILINE panelboards and switchboards). Loadcenter, plug-in circuit breakers shall not be acceptable unless specifically indicated on the drawings. They shall be thermal magnetic, molded-case with quick-make, quick-break contact action. They shall have thermal and magnetic tripping elements on each pole. Breakers with multiple poles shall have common tripping of all poles. Circuit breaker ampere ratings shall be stamped on the handle. Interrupting ratings of the circuit breakers shall be equivalent to the specified AIC rating of the panelboard. Breakers handles shall reside in a position between "ON" and "OFF" after a trip condition. Breakers shall be rated HACR when used for heating, air-conditioning, and refrigeration; HID when used with High Intensity Discharge fixtures; and shall be rated SWD when used for switching duty.
- B. Circuit breaker sizes for motor loads are based on Square D recommendations for use of their breakers at the motor horsepower listed on the mechanical drawings. If equipment is used other than Square D, adjust breaker sizes per the manufacturer's recommendations.
- C. Each circuit breaker supplying a multiwire branch circuit shall be installed with a manufacturer supplied handle tie to simultaneously disconnect all ungrounded conductors. Each multiwire branch circuit shall comply with NEC article 210.4.
- D. Circuit breakers with slash ratings, such as 120/240V or 480Y/277V, shall be used in solidly grounded systems where the nominal voltage of any conductor to ground does not exceed the lower of the two values of the breaker's voltage rating and the nominal voltage between any two conductors does not exceed the higher value of the circuit breaker's voltage rating.
- E. Circuit breakers with straight voltage ratings, such as 240V or 480V, shall be used in systems other than solidly grounded systems (Corner-Grounded Delta, Ungrounded, Impedance Grounded, etc.) where the nominal voltage between any two conductors does not exceed the circuit breaker's voltage rating. A two-pole circuit breaker shall not be used to protect a three-phase, Corner-Grounded Delta system unless the circuit breaker is marked 1 Φ -3 Φ .

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PART 3 – EXECUTION

- 3.1 Install panelboards in complete compliance with all manufacturers' installation instructions.
- 3.2 Install conductors neatly in panelboards. Group and tie-wrap circuits that share a common neutral.
- 3.3 Number circuits exactly as shown on the contract drawings.

END OF SECTION

SECTION 262800 - DISCONNECTS AND SEPARATELY-MOUNTED CIRCUIT BREAKERS

PART 1 – GENERAL

Furnish and install all disconnects and separately mounted circuit breakers as shown on the drawings, specified herein, and required by the NEC.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Disconnects shall be of the heavy-duty type, and shall be UL listed for service entrance use. They shall meet or exceed the requirements of NEMA Standard KS1. Provide fuses sized to appropriately protect the load served. Equipment manufacturer's recommendations shall take precedence over the Contract Drawings.
- B. Fuses shall be dual element, time-delay, Class J fuses. They shall be Bussman Low-Peak or approved equal.
- C. Circuit breakers shall be thermal magnetic, molded-case with quick-make, quick-break contact action. They shall have thermal and magnetic tripping elements on each pole. Breakers with multiple poles shall have common tripping of all poles. Circuit breaker ampere ratings shall be stamped on the handle. Interrupting ratings of the circuit breakers shall be equivalent to the specified AIC rating of the panelboard. Breakers handles shall reside in a position between "ON" and "OFF" after a trip condition. Breakers shall be rated HACR when used for heating, air-conditioning, and refrigeration; HID when used with High Intensity Discharge fixtures; and shall be rated SWD when used for switching duty.
- D. Circuit breaker sizes for motor loads are based on Square D recommendations for use of their breakers at the motor horsepowers listed on the mechanical drawings. If equipment is used other than Square D, adjust breaker sizes per the manufacturer's recommendations.
- E. Circuit breakers with slash ratings, such as 120/240V or 480Y/277V, shall be used in solidly grounded systems where the nominal voltage of any conductor to ground does not exceed the lower of the two values of the breaker's voltage rating and the nominal voltage between any two conductors does not exceed the higher value of the circuit breaker's voltage rating.
- F. Circuit breakers with straight voltage ratings, such as 240V or 480V, shall be used in systems other than solidly grounded systems (Corner-Grounded Delta, Ungrounded, Impedance Grounded, etc.) where the nominal voltage between any two conductors does not exceed the circuit breaker's voltage rating. A two-pole circuit breaker shall not be used to protect a three-phase, Corner-Grounded Delta system unless the circuit breaker is marked 1 Φ -3 Φ .
- G. Disconnect and individually-mounted circuit breaker ampere interrupting current (AIC) ratings shall equal the rating of the panelboard from which they are fed unless otherwise noted.
- H. Buses shall be constructed of 98% conductivity copper or equivalently rated aluminum.

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- I. Switches shall be horsepower rated where used to serve motors.
- J. Enclosures shall be NEMA 1 when they are to be mounted indoors, NEMA 3R when they are to be mounted outdoors, and NEMA 4X where they are subject to washdown. Provide special enclosures where shown on the Contract Drawings.

2.2 ACCEPTABLE MANUFACTURERS

Disconnects and separately-mounted circuit breakers shall be manufactured by Siemens, Square D, General Electric, or Cutler Hammer.

PART 3 – EXECUTION

- 3.1 Install disconnects and individually-mounted circuit breakers in complete compliance with all manufacturers' installation instructions. Where necessary, provide structural supports and bracing for installation.
- 3.2 Disconnects are to be surface-mounted.
- 3.3 Individually-mounted circuit breakers are to be flush-mounted unless otherwise shown.

END OF SECTION

SECTION 265100 - LIGHTING

PART 1 – GENERAL

- 1.1 Provide all lighting fixtures (luminaires), lamps, end caps, connectors, fittings, structural support members, supports, brackets, etc., for a complete and operable lighting system.
- 1.2 Prior to submitting electrical equipment brochures for review and approval, coordinate with the General Contractor and verify that the fixtures are appropriate for the ceiling types in which they are shown to be installed. Also verify that ballast voltage on the submittals is appropriate for the electrical system on which the fixtures are to be installed (regardless of voltage listed in the part number in the Fixture Schedule). Submit with equipment brochures a certificate stating that these items of coordination have been completed.
- 1.3 Provide photometric calculations where luminaires are proposed for substitution.
- 1.4 Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- 1.5 Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on construction, dimensions, ratings, finished, mounting requirements, listing, service conditions, and installed accessories. Include model number nomenclature clearly marked with all proposed features. Where the part number indicates components not shown on cut sheet, provide supporting cut sheet data for the part number. **Applicable data for fixtures proposed shall be highlighted – including any special notes about application!**

PART 2 – PRODUCTS

2.1 LUMINAIRES

- A. Luminaires are shown in the Luminaire Schedule on the drawings to establish a standard of quality. Manufacturer's names and model numbers shall not be interpreted as a proprietary specification. Notify the engineer at least two weeks prior to bid if an equivalent for a fixture listed in the schedule is not readily available,
- B. Provide the appropriate trim types, lenses, and accessories for proper installation in the area shown on the drawing. Coordinate with the ceiling contractor during the creation of shop drawings to ensure that fixtures are appropriate for the type of ceiling being installed.

2.2 LAMPS

LED lamps shall be LM79 and LM80 tested.

2.3 LED DRIVERS

- A. General Requirements:

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1. Operate for at least 50,000 hours at maximum case temperature and 90 percent non-condensing relative humidity.
2. Provide thermal fold-back protection by automatically reducing power output (dimming) to protect LED driver and LED light engine/fixture from damage due to over-temperature conditions that approach or exceed the LED driver's maximum operating temperature at calibration point.
3. UL 8750 recognized or listed as applicable.
4. Class A sound rating; Inaudible in a 27 dBA ambient.
5. Demonstrate no visible change in light output with a variation of plus or minus 10 percent change in line-voltage input.
6. LED drivers of the same family/series to track evenly across multiple fixtures at all light levels.
7. Offer programmable output currents in 10 mA increments within designed driver operating ranges for custom fixture length and lumen output configurations, while meeting a low-end dimming range of 100 to 1 percent or 100 to 5 percent as applicable.
8. Employ integral fault protection up to 277 V to prevent LED driver damage or failure in the event of incorrect application of line-voltage to communication link inputs.
9. LED driver may be remote located up to 100 feet (30 m) from LED light engine depending on power outputs required and wire gauge utilized by installer.

B. Driver Control:

1. Provide integral fault protection to prevent driver failure in the event of a mis-wire.
2. Operate from input voltage of 120 V through 277 V at 50/60 Hz.
3. Drivers and their associated controls shall be coordinated to ensure they are compatible.

2.4 EMERGENCY DRIVERS

- A. Emergency Drivers: Emergency drivers shall consist of an automatic power failure device, a test switch, and a pilot light that is visible from outside of the fixture. They shall contain a fully automatic solid state charger in a self-contained power pack. The fixture shall be factory wired in a manner that will allow the emergency lamps to be switched while still maintaining charging power to the battery. Wiring Diagrams shall be furnished with the fixture showing switching connections. The battery shall be of the sealed electrolyte type with the capacity to provide power to the lamps provided for a minimum of 90 minutes according to the following formula:

Delivered Lumens = $1.25 \times \text{Output Power of Emergency Driver} \times \text{Lumen per Watt rating of the Luminaire}$

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Note: See Fixture Schedule on Drawings for specified Emergency Driver

The battery shall be able to operate unattended with no maintenance for a period of no less than five years. Emergency ballasts shall be fully compatible with solid state ballasts. Battery packs shall be mounted inside the fixture unless remotely mounted ballasts are shown on the drawings, or unless the fixture is of a type that does not have room for internally mounted battery packs.

2.5 SUPPORTS

- A. Provide all structural members necessary to support fixtures in locations shown on the contract drawings. Submit mounting and support details to the Architect or Engineer for approval with the project shop drawings. Notify the General Contractor prior to bid of any structural work that will be required to support the fixtures.
- B. Provide hangers, cords, stems, etc., where required. Coordinate with the Architect or Engineer for proper stem lengths prior to ordering fixtures.
- C. Support the recessed light fixtures at all four corners of the fixture.
- D. Provide clips for fixtures installed in lay-in ceilings. Clips shall be equal to Erico Caddy clips # 515 or #515A.

PART 3 – EXECUTION

- 3.1 Raceways for lighting systems in accessible ceilings shall be run to junction boxes mounted in locations that do not interfere with the ceiling installation, the luminaire installation, or other building systems. Provide final connections to fixtures using conductors in flexible conduit. Flexible conduit whips shall not exceed six feet in length.
- 3.2 All recessed fixtures shall be mounted with their trims flush against the ceiling.
- 3.3 Comply completely with all manufacturers' installation instructions.
- 3.4 Fixtures shall be warranted for a period of five years after beneficial occupancy.

END OF SECTION

SECTION 273000 - DATA SYSTEMS

PART 1 – GENERAL

- 1.1 Provide complete Data systems in accordance with this specification and the contract drawings. All systems shall be furnished and installed to meet or exceed EIA/TIA Category 6 Standards.
- 1.2 All new wiring on this project shall conform to the EIA TIA 568A T568A scheme.
- 1.3 Prior to ordering equipment, provide six sets of manufacturer's cut sheets to the Architect or Engineer for the equipment to be installed. Also submit shop drawings showing the floor plan with all wiring tag identification and conduit and cable routing. Do not order any equipment without receiving submittals and shop drawings that have been reviewed and approved by the Engineer.
- 1.4 Contractors furnishing and installing Data system components shall be regularly involved in furnishing and installing systems of the type specified. They shall have installed five systems similar in size and scope within the past six months. The Data System Contractor shall pull the cable as well as install all jacks and make all other system terminations.

PART 2 – PRODUCTS

- 2.1 Outlet Boxes: Provide outlet boxes in accordance with Specification 260533.
- 2.2 Plaster Rings: Plaster rings shall be furnished to provide single-gang openings in outlet boxes unless otherwise noted.
- 2.3 Raceways: Provide raceways in accordance with Specification 260533.
- 2.4 Jacks: Provide outlet boxes with a strap containing the number of Jacks indicated on the drawings. Outlet jacks shall be 8-position, 8-conductor, RJ-45 jacks that are multivendor supportive accepting most phone and data plugs. Jacks shall have gold-plated (50 microinches minimum) contacts with 110 connections on the back. The jacks shall snap in the straps. The straps shall be colored to match the switches and receptacle color selected by the Architect. The straps shall be covered by a stainless steel wallplate identical to those of the receptacles and switches. Telephone outlet jacks shall be yellow; data jacks shall be blue.
- 2.5 Fiber Optic Cabling: Cable shall be a 12 strand single mode.
- 2.6 Cable: All cable shall be Category 6 rated and shall conform to or exceed the EIA/TIA 578 Commercial Building Wiring Standard, Horizontal Cable Section and the EIA/TIA Technical Systems Bulletin 36 for Unshielded Twisted Pair Cables. Other standards supported shall include IEEE 802.3, Ibase5, 10BASE-T; IEEE 802.5, 4 Mbps, 16 Mbps (328 ft/100m), 104 Workstations, proposed ANSI X3T9.5 TP-PMD requirements for UTP at 100 Mbps, and 155 MB ATM. Cabling shall be UL listed. Telephone cables shall be yellow; data cables shall be blue. All Cable shall be plenum rated.

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- 2.7 Data Backboard (TDBB): Wall mount a ¾" x 4' x 8' sheet of plywood, primed and painted with two coats of fire retardant paint of the color and finish selected by the Architect. Provide a ¼" x 4" x 17.75" copper ground block (Erico Eritech TMGB-A18L23PT or approved equal) on the wall, bond a #6 AWG copper conductor to the ground block with a two hole compression lug and run the #6 AWG ground wire to the electrical power system ground. Bond the #6 AWG ground wire to the power system electrode using an exothermic weld.
- 2.8 Patch Panels: Data Cables shall terminate at the Data Backboard in patch panels. Provide a patch panel (or panels) at each TDBB to accommodate all cabling plus 15% spare capacity. Provide crossconnecting cables as required to interconnect the patch panels providing the Owner a single connection point for a connection to a server.
- 2.9 Racks: Provide a 19" rack for mounting of the patch panels. The rack shall be mounted on the TDBB.

PART 3 – EXECUTION

- 3.1 Provide a 1" conduit extending from each outlet box to a point above the nearest accessible ceiling. Terminate the conduit with a protective bushing.
- 3.2 Route conductors from the outlet box, above the lay-in ceilings, and to the Data backboard. Group, tie-wrap, and support the conductors from the structural ceiling above the lay-in ceiling. Provide conduit for sleeves where cables pass through areas with hard ceilings.
- 3.3 Provide a minimum of two data cables to each data outlet or combination telephone/data outlet. Provide one cable to each telephone outlet.
- 3.4 Mount plywood backboard securely to wall framing members. The bottom of the backboard shall be 6" above the finished floor.
- 3.5 Provide a #6 copper ground wire in 1" PVC conduit from the Data Backboard to the Building Power System Ground.
- 3.6 Provide a fiber optic cable in a 2"C. from the existing data rack to the new data rack.
- 3.7 Fiber Optic: Terminate all fiber optic strands at the rack in a fiber optic termination box.
- 3.8 Equip all spare conduits with a pullwire or string capable of withstanding 200 pounds of pulling tension.
- 3.9 Uniquely identify and label all cables at each end using EIA/TIA Standards. Provide engraved or professionally stenciled label markings on the faceplate beside each jack.
- 3.10 Test each cable for opens, shorts, correct pairs, crossed wiring, and proper termination using a CT200 tester from Atcom Services, Inc. or approved equal. Replace any cable that is unable to pass the tests. Provide a written log of the test results of each cable to the Engineer at the prefinal inspection. Demonstrate testing of any cables selected by the Engineer.

END OF SECTION

SECTION 31 05 17
GRANULAR MATERIALS (610 LIMESTONE GRAVEL)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Granular Material (610 Crushed Limestone Gravel).
- B. Related Sections:
 - 1. None

1.2 PAYMENT

- A. Granular Material:
 - 1. Basis of Payment: Includes excavating existing subsoil, supplying, hauling, stockpiling, placing, and compacting granular materials. When this item is paid for by the ton the amount delivered will be reduced by the percent of water contained in a representative sample of the material delivered.

1.3 REFERENCES

- A. *Mississippi Standard Specifications for State Aid Road and Bridge Construction, 2004 Edition.*

1.4 SUBMITTALS

- A. Per Section 304 of the *Mississippi Standard Specifications for State Aid Road and Bridge Construction, 2004 Edition.*
- B. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.
 - 1. Include a gradation test meeting the requirements of ASTM C136
 - 2. The contractor shall deliver a sample of material to a testing laboratory selected by the engineer for quality control testing. The amount of material will be a minimum of 10 gallons.

1.5 QUALITY ASSURANCE

- A. Furnish each granular material from a single source throughout the Work.
- B. Per Section 304 of the *Mississippi Standard Specifications for State Aid Road and Bridge Construction, 2004 Edition.*

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PART 2 - PRODUCTS

2.1 GRANULAR MATERIALS (STONE GRAVEL)

- A. Granular Materials (Stone Gravel): Size 610 Crushed Limestone per Section 703.04.3 of the *Mississippi Standard Specifications for State Aid Road and Bridge Construction, 2004 Edition*.
- B. Crushed Concrete shall not be used unless approved by the engineer and the owner.

2.2 SOURCE QUALITY CONTROL

- A. Per Section S-304 and S-703 of the *Mississippi Standard Specifications for State Aid Road and Bridge Construction, 2004 Edition*.
- B. A sample of material will be taken every 500 tons to determine acceptance for gradation.
- C. The owner shall have the authority to send one delivery truck for every 2000 tons to a certified scale to verify delivery tickets.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Upon delivery to the site the Contractor will place a sample of material in a waterproof container. The sample will be used to determine the moisture content of the material at the time of delivery.
 - 1. A sample may be taken from each truck or one sample may be used to represent trucks delivered in a 24-hour period.
- B. Contractor shall perform a proof roll of the sub-base at the engineer's direction prior to placement of material.
- C. Material will be placed in lifts no greater than eight inches and compacted to 98% standard proctor.

3.2 STOCKPILING

- A. Per Section 304 of the *Mississippi Standard Specifications for State Aid Road and Bridge Construction, 2004 Edition*.
- B. Stockpile location will be requested by the contractor and will require approval of the engineer prior to any delivery.

3.3 STOCKPILE CLEANUP

- A. Leave unused materials in neat, compact stockpile.

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- B. When borrow area is indicated, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION

SECTION 31 22 13

SITE GRADING FOR BUILDING ONLY

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Execute grading operations for the building pad in accordance with this specification section.
- B. The building area is defined as the building footprint plus a 5' wide strip beyond and adjacent to the exterior face of foundation walls. Remove topsoil and any weak soils exposed within the building area; stockpile for later re-use. At the concession stand, excavate to 6' below the finish floor elevation, remove the existing soils, and replace with select fill.
- C. Remove vegetation as required for proposed construction.
- D. Coordinate with utility companies the installation of new underground utilities:
 - 1. Electricity.
 - 2. Water/sewer.
 - 3. Telephone.
 - 4. Gas.
- E. Remove fencing as required.
- F. Remove existing paving as required.
- G. Take special care to include work shown on the site plans.
- H. Testing of soils.
- I. Sediment control.

1.02 RELATED WORK

- A. Section 03 30 00 – Cast-In-Place Concrete
- B. Section 31 22 10 – Rough Grading
- C. Section 31 22 19 – Finish Grading
- D. Section 31 23 10 – Excavation and Fill for Building Only

1.03 PROTECTION

- A. Protect features remaining as a portion of the final landscaping.

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- B. Take necessary precautions to avoid damaging existing utilities.
- C. Repair any damage caused by the rough grading process.
- D. Grade the site to drain during the construction process. Maintain excavations free of water. Provide and operate pumping equipment to keep excavations free of water.

1.04 COORDINATION

- A. Coordinate rough grading work with underground site utilities. Take special care to protect below-grade utilities. It is the responsibility of the rough grading contractor to confirm underground utility locations prior to initiation of grading work.

1.05 CONTRACTOR'S RESPONSIBILITIES

- A. It is the responsibility of the Contractor to provide all engineering work associated with lay-out. Written verification of lay-out by a Mississippi-registered engineer or land surveyor is required.
- B. It is the responsibility of the Contractor to provide all engineering work associated with establishing design elevations. Written verification of design elevations by a Mississippi-registered engineer or land surveyor is required.
- C. The Contractor is responsible for work related to sediment control during the construction process and until an established vegetation cover is in place. Sediment control shall be in accordance with the Mississippi Department of Environmental Quality Storm Water Pollution Control Program. The Contractor is responsible for implementation of a storm water pollution prevention plan which complies with pertinent state regulations. Sediment control shall include at a minimum silt fences, drainage control, and the maintenance of threshed straw over all disturbed areas of the site. Minimum requirements:
 - 1. The Contractor shall limit exposure of disturbed areas to the shortest amount of time practicable and divert surface water around disturbed areas of the site whenever possible.
 - 2. The Contractor shall remove sediment from storm water before it leaves the site by appropriate methods.
 - 3. The Contractor shall implement and maintain controls as needed to prevent erosion and sediment from adversely affecting downstream property throughout construction of the project. When work is not being performed in a disturbed area, the Contractor shall install appropriate temporary and/or vegetative and structural practices to ensure that erosion and sediment from the construction site does not flow onto adjoining properties. Other controls shall minimize off-site vehicle tracking of sediments.
 - 4. Controls and management practices used to mitigate adverse impacts from storm water runoff may include, but are not limited to, silt fencing, sediment traps, hay bales, brush, barriers, interceptor dikes, and swales.

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PART 2 - PRODUCTS

2.01 MATERIALS

- A. Topsoil: Excavated material, graded free of roots, subsoil, debris, and large weeds. Re-use existing topsoil. Stockpile for re-use.
- B. Subsoil: Excavated material, graded free of lumps larger than 6", rocks larger than 3", and debris.
- C. The near-surface soils may be suitable for re-use, if moisture contents are not elevated.
- D. Select fill: Refer to Section 31 23 10.

PART 3 - EXECUTION

3.01 PREPARATION

- A. The Contractor shall lay out the rough grading work from the drawings and furnish, set, and maintain all necessary stakes, bench marks, and batter boards for determining clearly all required lines and levels. Verification is required; see 1.05.
- B. The Contractor shall be responsible for his lay-out and shall correct any errors and verify measurements and elevations.
- C. Identify all below-grade utilities. Stake and flag locations. The Contractor is responsible for contacting city, county, and utility officials to ensure that all below-grade utilities are located and flagged.
- D. Identify and flag all above-grade utilities. The Contractor is responsible for contacting city, county, and utility officials to ensure that all above-grade utilities are located and flagged

3.02 EXCAVATION

- A. Remove all rubbish, concrete, and any remaining topsoil or humus matter prior to construction.
- B. After excavation, check for stability. Stability is defined as the absence of excessive soil movement or pumping under normal compaction efforts. If unstable areas are discovered, remove the unstable material down to a firm stable layer.
- C. After excavating, install all new underground utilities within the building area. All utility trenches that cross into the building area shall be effectively sealed to restrict water intrusion into the building area. Construct a clay trench plug that extends out 5 feet laterally from the face of the building, using a silty clay material compacted around and above the pipe at a water content at or above the soils optimum water content.
- D. Undercut and backfill wet or soft areas of the site with select material as required to achieve compaction to a minimum of 95% of standard proctor. NO UNAUTHORIZED OVER-EXCAVATION SHALL BE PERMITTED.

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- E. The receiving subgrade shall be maintained in a moist (above optimum moisture) condition prior to filling.
- F. Relocated and imported materials shall be compacted to 95% of maximum dry density (standard proctor), achieved in maximum loose lifts of 9" at a moisture content within 3%

3.03 GRADING AND CONTOURING

- A. The Contractor is responsible for all engineering services required to establish grading elevations.
- B. Grade and contour the site in accordance with the grading plans.

3.04 TESTING

- A. A commercial testing laboratory will be hired by the Owner to make all necessary test. The contractor shall coordinate with testing lab to allow for proper testing schedule.
 - 1. One (1) density is required per 2,000 s.f. of lift within the building area.

END OF SECTION

SECTION 31 23 10

EXCAVATION AND FILL FOR BUILDING ONLY

PART 1 - GENERAL

1.01 WORK INCLUDED

Execute grading operations in with this specification section.

- A. Site-filling and compaction.
- B. Fill within building area. .
- C. Limestone under all building slabs-on-grade.
- D. At the concession stand, excavate to a level 6' below finish floor elevation, remove soils and replace with select fill.

1.02 RELATED WORK

- A. Section 31 2213 – Site Grading for Building Only
- B. Section 31 2214 – Site Grading

1.03 COORDINATION

- A. Coordinate fill operations with installation of underground utilities.
- B. Coordinate fill operations with installation of the foundation system.
- C. Coordinate fill operations with installation of the storm drainage system.

1.04 CONTRACTOR'S RESPONSIBILITIES

- A. It is the responsibility of the Contractor to provide all engineering work associated with lay-out. Written verification of lay-out by a Mississippi-registered engineer or land surveyor is required.
- B. It is the responsibility of the Contractor to provide all engineering work associated with establishing design elevations. Written verification of design elevations by a Mississippi-registered engineer or land surveyor is required.
- C. A commercial testing laboratory will be hired by the Owner to make all necessary test. The contractor shall coordinate with testing lab to allow for proper testing schedule. Promptly submit copies of all field density tests to the Architect.

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PART 2 - PRODUCTS

2.01 FILL MATERIALS

- A. The near-surface soils may be suitable for reuse as select fill. Moisture conditioning may be required for reuse.
- B. Relocated material shall be free of rubbish, concrete, topsoil, and humus matter.
- C. Select fill required within the building area shall consist of non organic and debris free silty clays (CL) or sandy clays (CL), having a liquid limit less than 45 and a plasticity index PI in a range of 10 to 24. Clayey sands (SC) with a liquid limit less than 35 and a plasticity index PI in a range of 7 to 15 are also acceptable.
- D. Provide 4" of crushed limestone under building slabs.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that areas to be filled are free of debris, snow, ice, or water and that ground surfaces are not frozen.
- B. Any unsuitable material found after the site has been stripped and proof-rolled shall be removed and replaced by the Contractor.

3.02 PREPARATION

- A. Prior to construction, all rubbish, concrete, and any remaining topsoil or humus matter shall be removed.
- B. See requirements of specification section 31 2213, 3.02.
- C. Prior to construction, the Contractor shall furnish and install drainage ditches to facilitate run-off. Operate pumps and pumping equipment as required.
- D. The Contractor is responsible for lay-out of areas to be filled and all engineering services required to ensure that fill is installed to the required elevations. Written verification is required.
- E. A commercial testing laboratory will be hired by the Owner to make all necessary test. The contractor shall coordinate with testing lab to allow for proper testing schedule to verify and confirm that fill under buildings and paving is compacted as specified.

3.03 FILLING

- A. Fill areas to required contours and elevations. Use unfrozen materials.
- B. Fill systematically, as early as possible, to allow maximum time for natural settlement. Do not fill over porous, wet, or spongy subgrade surfaces.
- C. Compaction shall be achieved in maximum loose lifts of 9".

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- D. Make changes in grade gradually. Blend slopes into level areas.
- E. All fill within building area shall be compacted to 95% of maximum dry density (standard proctor), achieved in maximum loose lifts of 9" at a moisture content within 3% of the optimum moisture content established in the Proctor tests.
- F. A commercial testing laboratory will be hired by the Owner to make all necessary test. The contractor shall coordinate with testing lab to allow for proper testing schedule. Promptly submit copies of all field density tests to the Architect.

3.04 TESTING

- A. A commercial testing laboratory will be hired by the Owner to make all necessary test. The contractor shall coordinate with testing lab to allow for proper testing schedule.
- B. Field moisture-density tests should be performed utilizing a nuclear device in accordance with ASTM D2922 at a frequency of:
 - 1. One (1) test per 2,000 s.f. per 9" loose lift of select fill within the building area.

END OF SECTION

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SECTION 312316 - EXCAVATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Soil densification.
2. Excavating for Drainage.
3. Excavating for paving, roads, and parking areas.
4. Excavating for Rip Rap.

B. Related Requirements:

1. Section 313716.13 – Rip Rap.

1.2 PAYMENT

A. **Excess Excavation:**

1. Basis of Payment: Payment will be made at the price set in the bid form and will include material that cannot be used with the project limits. This will include any type, kind, muck, or class of material that the engineer determines must be removed for the project site. It will not include any excess caused by the contractor importing too much excavation from sources outside the project limits; in such case, the excess excavation shall be removed from the project without cost to the owner

B. **Borrow Excavation:**

1. Basis of Payment: Payment will include approved material of a type set up in the plans and specifications that is required for the construction of embankment or other portions of the work and shall be obtain from and approved source outside of the project limits. Contractor shall make arrangements for obtaining borrow.

C. **Unclassified Excavation:**

1. Basis of Payment: Payment will include excavating material from one area inside the project limits and placing that material at another location inside the project limits.

1.3 MEASUREMENTS

- A. All excavation types will be measured by field measurements. These measurements will be made by using the existing topographic data used in the plan design.

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1. The engineer will furnish the contractor a LANDXML file containing the existing topographic data.
- B. Quantity measurements will be made by the engineer.
 1. Measurement of excavation will be made in the field by the engineer's representative for all regular areas.
 2. Data will be collected on irregular areas by a survey crew.
- C. If the engineer approves the use of Load Vehicle Measure (LVM) it will be measured based on the following conditions.
 1. The engineer's representative will measure each truck being used. The measurements will be taken from the inside of the dump body. Any boards or shoring added to the dump body will not be included.
 2. The conversion factor from LVM to FM will be 0.67.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

1.5 QUALITY ASSURANCE

- A. Perform Work according to Section 203 of the Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition

PART 2 - PRODUCTS

- 2.1 Borrow Excavation: CL Material having a liquid limit less than 45 and a plasticity index (PI) within the range of 10 to 24, or a clay sand (SC) with a PE in the range of 7 to 15 and a liquid limit less than 35
 - A. Unless listed in the construction drawings or the bid form Borrow Excavation shall meet the requirements of a Class B9-10 as set forth in Section 703.21 of the Mississippi Standard Specification for Road and Bridge Construction 2017 Edition.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Utility Service Locator:
 1. Call local utility service-line information at 811 not less than three working days before performing Work.

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2. Request that underground utilities be located and marked within and immediately surrounding construction areas.
3. Identify required lines, levels, contours, and data.

B. Existing Utilities:

1. Protect from damage utilities indicated to remain.

C. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

D. Do not close or obstruct roadways, sidewalks, hydrants without permits.

E. Erect and maintain temporary barriers and security devices, including warning signs, warning lights, and similar measures, for protection of public and existing improvements indicated to remain.

3.2 EXCAVATION

A. Excavate subsoil to accommodate construction operations.

B. Compact disturbed load-bearing soil in direct contact with foundations to 95% Standard Proctor.

C. Slope banks with machine to angle of repose or less until shored.

D. Do not interfere with 45-degree bearing splay of foundations.

E. Grade top perimeter of excavation to prevent surface water from draining into excavation.

F. Trim excavation and remove loose matter.

G. Removal of Deleterious Materials:

1. Remove lumped subsoil, boulders, and rock up to 1/3 cu. yd., measured by volume.
2. Remove excess and unsuitable material from Site.

H. Notify Architect/Engineer of unexpected subsurface conditions.

I. Correct over-excavated areas with borrow excavation as directed by Architect/Engineer.

J. Remove excavated material from Site.

K. Repair or replace items indicated to remain that have been damaged by excavation.

L. All excavation place in ditch embankment will be compacted to 90% standard proctor.

3.3 PROTECTION

A. Prevent displacement or loose soil from falling into excavation and maintain soil stability.

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- B. Protect structures, utilities, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that may be created by earth operations.

END OF SECTION 312316

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SECTION 312500 - EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Silt Fence.
 - 2. Wattles

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Silt Fence:
 - 1. Basis of Payment: Includes excavating, windrowing, compacting, seeding, and mulching.
- B. Wattles:
 - 1. Basis of Payment: This work consists of furnishing, constructing, and maintaining wattles for the retention of soil around inlets, swale areas, small ditches, sediment basins and other areas as necessary. Also, the work includes removing and disposing of the wattles and silt accumulations.

1.3 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Test Reports: Indicate certified tests results for precast concrete at manufacturing facility, cast-in-place concrete in field, and granular backfill.
- C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Perform Work according to the requirements of The Mississippi Department of Environmental Quality. and the approved SWPPP.
- B. Maintain one copy of each document on site.

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PART 2 - PRODUCTS

2.1 SILT FENCE

- A. Geotextile Fabric used in silt fence applications shall meet the requirements of Type I or II shown in Table 1 Section 714.13.11 of the Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition.
- B. Woven Wire Backing for reinforcing silt fence shall be at least 32 inches high and have no less than six horizontal wires.
 - 1. All wire shall be 10 gauge
- C. Post shall be steel or wood and shall meet the requirements of Section 714.13.2.2 of the Mississippi Standard specifications for Road and Bridge Construction 2017 Edition.

2.2 WATTLES

- A. Wattles used around inlets shall have a diameter of 12" all other wattles shall have a diameter of 20"
- B. Stakes shall be wooden and of an adequate size to stabilize the wattles to the satisfaction of the engineer.

PART 3 - EXECUTION

3.1 SILT FENCE

- A. Contractor shall place silt fence as required by the plans. The engineer may direct the contractor to place silt fence in areas not shown on the plans. The contractor is required to place silt fence in accordance with any storm water permits related to the project.
- B. All posts shall be installed so that no more than three feet of the post shall protrude above the ground. Extra post for bracing shall be installed as directed by the Engineer. The woven wire shall be securely fastened to the wood posts with staples. When metal posts are used, the wire shall be fastened to the post with wire or other approved means. The geotextile shall be attached to the wire fence by wire or other approved means. The bottom edge of the geotextile shall be buried six inches below ground surface to prevent undermining. When splicing of the geotextile is necessary, two posts shall be installed approximately 18 inches apart and each piece of geotextile shall be fastened to both posts.
- C. Type II geotextile may be installed without the woven wire fence backing if approved by the engineer and the following conditions are met.
 - 1. Post shall be no more than six feet apart.
 - 2. The manufacturer recommends its use without woven wire backing.

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3.2 WATTLES

- A. Wattles shall be installed at the locations and according to the requirements shown on the erosion control plan.
- B. The contractor shall maintain the wattles and remove and dispose of silt accumulations.

3.3 SITE STABILIZATION

- A. Incorporate erosion control devices indicated on the Drawings into the Project at the earliest practicable time.
- B. Construct, stabilize and activate erosion controls before site disturbance within tributary areas of those controls.
- C. Stabilize any disturbed area of affected erosion control devices on which activity has ceased and which will remain exposed for more than 20 days.
 - 1. During non-germinating periods, apply mulch at recommended rates.
 - 2. Stabilize disturbed areas which are not at finished grade and which will be disturbed within one year.
- D. Stabilize diversion channels, sediment traps, and stockpiles immediately.

3.4 CLEANING

- A. When sediment accumulation in sedimentation structures has reached a point one-third depth of sediment structure or device, remove and dispose of sediment.
- B. Do not damage structure or device during cleaning operations.
- C. Do not permit sediment to erode into construction or site areas or natural waterways.
- D. Clean BMP's when depth of sediment reaches approximately one quarter of the BMP.

END OF SECTION 312500

SECTION 31 31 16
TERMITE CONTROL

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Treatment below all slabs for subterranean insects.
- B. Treatment of crawl spaces and foundations systems for subterranean insects.
- C. Treatment of horizontal barriers at perimeter of structure.

1.02 REGULATORY REFERENCES

- A. EPA – Federal Insecticide, Fungicide and Rodenticide Act.
- B. Regulations Governing Pest Control Operators, Mississippi Department of Agriculture and Commerce, Bureau of Plant Industry.

1.03 QUALITY ASSURANCE

- A. Applicator: Company specializing in soil treatment for termite control with three (3) years documented experience.
- B. Materials: Provide certification that toxicants comply with EPA requirements.
- C. Material packaging: Manufacturer's labels and seals identifying content.

1.04 REGULATORY REQUIREMENTS

- A. Comply with State of Mississippi requirements for application licensing and authority to use toxicant chemicals.
- B. Specific license/permit category requirements: Control of Termites and Other Structural Pests, Control of Pests in Homes, Businesses and Industries.
- C. Comply with the requirements of the EPA.

1.05 PRODUCT DATA

- A. Submit product data.
- B. Indicate toxicants to be used, composition by percentage, dilution schedule, and intended application rate.
- C. Submit the manufacturer's installation instructions.
- D. Submit warranty document for approval.
- E. Submit copy of the applicator's license.

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1.06 BOND AND INSURANCE REQUIREMENTS

- A. Minimum surety bond sum:
 - 1. \$5,000.00.
 - 2. As required by the regulations listed in 1.02, if greater.
- B. Minimum insurance:
 - 1. \$100,000.00 per occurrence or aggregate of \$200,000.00.
 - 2. As required by the regulations listed in 1.02, if greater.

1.07 WARRANTY

- A. Provide five-year warranty for material and installation.
- B. Warranty: Cover against invasion or propagation of subterranean termites, damage to building or building contents caused by termites, and repairs to building or building contents so caused.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Chemicals used must be those acceptable to the Division of Forest Insect Research, Forest Service, USDA, or proprietary products registered with the Pesticide Regulation Section, Agricultural Research Service, USDA, under the Federal Insecticide, Fungicide and Rodenticide Act, for use as a termite toxicant for which prolonged effectiveness may be anticipated. The following chemicals and concentration in water solution shall be used:
 - 1. Termidor by BASF.
- B. Proprietary material may be used:
 - 1. If they meet a U.S. Forest Service five-year field test;
 - 2. If they contain one or more of the above named chemicals in the concentration given;
 - 3. If proof is provided that no toxic effects to humans or beneficial plant and animal life will result from their use.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify that the substrate is in friable condition with moisture content low enough to permit absorption of the toxicant solution.

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- B. Do not begin work until all preparatory work for slab placement has been completed.

3.02 APPLICATION

- A. Location:

1. Apply soil treatment to areas beneath concrete slabs.
2. Additional termiticide is required if fill is gravel or other coarse aggregate.
3. Additional termiticide is required at bath traps and other openings in the slab.

- B. Rates of application:

1. Apply in strict accordance with the chemical manufacturer's written instructions.
2. Apply at concentrations or volume as specified on the label of the approved pesticide product.
3. Strictly comply with EPA requirements and regulations.

- C. Application technique:

1. Treatment shall not be made when the substrate is wet or immediately after heavy rains; avoid surface flow of toxicant from the application area.
2. Unless the substrate is promptly covered with fill and vapor barrier, precautions shall be taken to prevent disturbance of the treatment and human or animal contact with treatment and treated soil.

- D. All pretreats shall be made in strict accordance with label directions as specified on the label of the pesticide being applied.

- E. All perimeter treatments must be performed within one (1) year of treatment of the horizontal barrier. Perimeter treatments include the vertical barrier around the perimeter of the structure.

- F. Pretreatments shall include all structures built adjacent to the foundation, such as porches and patios.

- G. Reapply treatment if rainfall follows initial treatment or if slab is not poured within twenty-four (24) hours of treatment.

END OF SECTION

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SECTION 312316 - EXCAVATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Soil densification.
2. Excavating for Drainage.
3. Excavating for paving, roads, and parking areas.
4. Excavating for Rip Rap.

B. Related Requirements:

1. Section 313716.13 – Rip Rap.

1.2 PAYMENT

A. **Excess Excavation:**

1. Basis of Payment: Payment will be made at the price set in the bid form and will include material that cannot be used with the project limits. This will include any type, kind, muck, or class of material that the engineer determines must be removed for the project site. It will not include any excess caused by the contractor importing too much excavation from sources outside the project limits; in such case, the excess excavation shall be removed from the project without cost to the owner

B. **Borrow Excavation:**

1. Basis of Payment: Payment will include approved material of a type set up in the plans and specifications that is required for the construction of embankment or other portions of the work and shall be obtain from and approved source outside of the project limits. Contractor shall make arrangements for obtaining borrow.

C. **Unclassified Excavation:**

1. Basis of Payment: Payment will include excavating material from one area inside the project limits and placing that material at another location inside the project limits.

1.3 MEASUREMENTS

- A. All excavation types will be measured by field measurements. These measurements will be made by using the existing topographic data used in the plan design.

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1. The engineer will furnish the contractor a LANDXML file containing the existing topographic data.
- B. Quantity measurements will be made by the engineer.
 1. Measurement of excavation will be made in the field by the engineer's representative for all regular areas.
 2. Data will be collected on irregular areas by a survey crew.
- C. If the engineer approves the use of Load Vehicle Measure (LVM) it will be measured based on the following conditions.
 1. The engineer's representative will measure each truck being used. The measurements will be taken from the inside of the dump body. Any boards or shoring added to the dump body will not be included.
 2. The conversion factor from LVM to FM will be 0.67.

1.4 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

1.5 QUALITY ASSURANCE

- A. Perform Work according to Section 203 of the Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition

PART 2 - PRODUCTS

- 2.1 Borrow Excavation: CL Material having a liquid limit less than 45 and a plasticity index (PI) within the range of 10 to 24, or a clay sand (SC) with a PE in the range of 7 to 15 and a liquid limit less than 35
 - A. Unless listed in the construction drawings or the bid form Borrow Excavation shall meet the requirements of a Class B9-10 as set forth in Section 703.21 of the Mississippi Standard Specification for Road and Bridge Construction 2017 Edition.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Utility Service Locator:
 1. Call local utility service-line information at 811 not less than three working days before performing Work.

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2. Request that underground utilities be located and marked within and immediately surrounding construction areas.
3. Identify required lines, levels, contours, and data.

B. Existing Utilities:

1. Protect from damage utilities indicated to remain.

C. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

D. Do not close or obstruct roadways, sidewalks, hydrants without permits.

E. Erect and maintain temporary barriers and security devices, including warning signs, warning lights, and similar measures, for protection of public and existing improvements indicated to remain.

3.2 EXCAVATION

A. Excavate subsoil to accommodate construction operations.

B. Compact disturbed load-bearing soil in direct contact with foundations to 95% Standard Proctor.

C. Slope banks with machine to angle of repose or less until shored.

D. Do not interfere with 45-degree bearing splay of foundations.

E. Grade top perimeter of excavation to prevent surface water from draining into excavation.

F. Trim excavation and remove loose matter.

G. Removal of Deleterious Materials:

1. Remove lumped subsoil, boulders, and rock up to 1/3 cu. yd., measured by volume.
2. Remove excess and unsuitable material from Site.

H. Notify Architect/Engineer of unexpected subsurface conditions.

I. Correct over-excavated areas with borrow excavation as directed by Architect/Engineer.

J. Remove excavated material from Site.

K. Repair or replace items indicated to remain that have been damaged by excavation.

L. All excavation place in ditch embankment will be compacted to 90% standard proctor.

3.3 PROTECTION

A. Prevent displacement or loose soil from falling into excavation and maintain soil stability.

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- B. Protect structures, utilities, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that may be created by earth operations.

END OF SECTION 312316

SECTION 32 16 23

SIDEWALKS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Concrete paving for sidewalks.

1.2 PAYMENT

- A. Section 01 20 00 - Price and Payment Procedures: Contract Sum/Price modification procedures.
- B. Sidewalks:
 - 1. Basis of Payment: Includes subbase, forms, reinforcing, concrete, accessories, placing, finishing, curing, and testing.

1.3 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO M182 - Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats.
- B. American Concrete Institute:
 - 1. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
- C. ASTM International:
 - 1. ASTM A184/A184M - Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement.
 - 2. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - 3. ASTM A706/A706M - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.
 - 4. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
 - 5. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars.

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6. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
7. ASTM A934/A934M - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
8. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
9. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
10. ASTM C33/C33M - Standard Specification for Concrete Aggregates.
11. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
12. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
13. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete.
14. ASTM C150/C150M - Standard Specification for Portland Cement.
15. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.
16. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete.
17. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
18. ASTM C231/C231M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
19. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete.
20. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
21. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
22. ASTM C595/C595M - Standard Specification for Blended Hydraulic Cements.
23. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
24. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
25. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete.
26. ASTM C989/C989M - Standard Specification for Slag Cement for Use in Concrete and Mortars.
27. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
28. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
29. ASTM C1116/C1116M - Standard Specification for Fiber-Reinforced Concrete.
30. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
31. ASTM C1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.
32. ASTM C1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
33. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

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34. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
35. ASTM D5893/D5893M - Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements.
36. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
37. ASTM E408 - Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
38. ASTM E903 - Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.
39. ASTM E1918 - Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
40. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

1.4 SUBMITTALS

A. Product Data:

1. Submit required information regarding concrete materials , joint filler , admixtures , and curing compounds.
2. Mix Design:
 - a. Submit concrete mix design for each concrete strength prior to commencement of Work.
 - b. Submit separate mix designs if admixtures are required for hot- and cold-weather concrete Work.
 - c. Identify mix ingredients and proportions, including admixtures.
3. Identify chloride content of admixtures and whether or not chloride was added during manufacture.

B. .

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

E. Qualifications Statement:

1. Submit qualifications for manufacturer and installer.

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1.5 QUALITY ASSURANCE

- A. Obtain cementitious materials from same source throughout.
- B. Perform Work according to ADA and PROWAG standards.
- C. Maintain one copy of each standard affecting Work of this Section on Site.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store materials according to manufacturer instructions.
- D. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

1.8 AMBIENT CONDITIONS

- A. Section 01 50 00 - Temporary Facilities and Controls: Requirements for ambient condition control facilities for product storage and installation.
- B. Minimum Conditions: Do not place concrete if base surface temperature is less than 40 deg. F, or if surface is wet or frozen.
- C. Subsequent Conditions: Maintain minimum 50 deg. F, for not less than 72 hours after placing, and at a temperature above freezing for remainder of curing period.

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1.9 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 AGGREGATE SUBGRADE

- A. As specified in Section 31 05 17 – Granular Material.

2.2 MATERIALS

A. Forms:

1. Material:
 - a. Wood: Straight and free from warping, twisting, loose knots, splits, or other defects.
2. Profile: To suit conditions.
3. Joint Filler:
 - a. Material: Asphalt-impregnated fiberboard or felt.
 - b. Comply with ASTM D1751.
 - c. Thickness: 1/4 inch.

B. Concrete:

1. Concrete Materials:
 - a. Furnish materials according to Class B Concrete per the Mississippi Standard Specification of Road and Bridge construction, Latest Edition.

2.3 MIXES

A. Concrete:

1. Comply with ASTM C94/C94M, Option A.
2. Admixtures:

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- a. Use accelerating admixtures in cold weather only if approved by Architect/Engineer in writing.
- b. Use of admixtures will not relax cold-weather placement requirements.
- c. Use calcium chloride only if approved by Architect/Engineer in writing.
- d. Use set-retarding admixtures during hot weather only if approved by Architect/Engineer in writing.

2.4 ACCESSORIES

A. Curing Compound:

- 1. Comply with ASTM C309.
- 2. Type: 2.
- 3. Class: A.

B. Joint Sealers:

- 1. Cold Applied: Comply with ASTM C920.

2.5 SOURCE QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Requirements for testing, inspection, and analysis.
- B. Testing: Comply with ASTM C94/C94M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify that compacted subgrade is dry and ready to support paving and imposed loads.
- C. Verify that gradients and elevations of subgrade are as indicated on Drawings.
- D. Verify reinforcing placement for proper size, spacing, location, and support.

3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.

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- B. Moisten substrate to minimize absorption of water from fresh concrete.
- C. Notify Architect/Engineer minimum 24 hours prior to commencement of concreting operations.

3.3 INSTALLATION

A. Subgrade:

- 1. As specified in Section 31 05 17 – Granular Material.

B. Forms:

- 1. Place and secure forms and screeds to correct location, dimension, profile, and gradient.
- 2. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- 3. Wood Forms: Thoroughly wet with water before concrete is placed.

C. Placing Concrete:

- 1. Place concrete in forms in one layer.
- 2. Place concrete continuously over full width of panel and between predetermined construction joints.
- 3. Do not break or interrupt successive pours such that cold joints occur.
- 4. Consolidate concrete by tamping and vibration.
- 5. Place concrete to pattern as indicated.

D. Joints:

- 1. Place continuous transverse expansion joints at 5-foot intervals or width of sidewalk, whichever is less.
- 2. Filler:
 - a. Place joint filler between paving components and building or other appurtenances.
 - b. Recess top of filler 1/4 inch for sealant installation.
- 3. Provide sawn joints at 5-foot intervals between sidewalks and curbs.
- 4. Provide keyed joints as indicated on Drawings.
- 5. Seal joints as indicated on Drawings

E. Finishing:

- 1. Light broom , and trowel edges of joints Edges and Joints:
 - a. Edger Radius: 1/8 inch.
 - b. Spalled Corners and Edges: Clean and fill with mortar mixture and finish.

F. Curing:

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1. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
2. Mats:

G. Backfilling: After curing, backfill, grade, and compact adjacent disturbed area as indicated.

3.4 TOLERANCES

- A. Maximum Variation of Surface Flatness: 1/4 inch in 10 feet.
- B. Maximum Variation from True Position: 1/4 inch.
- C. Line and Grade for Forms: 1/8 inch in any 10-foot-long section.

3.5 FIELD QUALITY CONTROL

A. Inspection and Testing:

1. Comply with ASTM C94/C94M.
2. Samples:
 - a. Sampling Procedures: Comply with ASTM C172/C172M.
 - b. Cylinder Molding and Curing Procedures: Comply with ASTM C31/C31M, standard cured.
 - c. Sample concrete and make one set of three cylinders for every 75 cu. yd. or less of each class of concrete placed each day, and for every 5,000 sq. ft. of surface area paving.
 - d. Make one additional cylinder during cold-weather concreting, and field cure.
3. Cylinder Compressive Strength:
 - a. Comply with ASTM C39/C39M.
 - b. Acceptance:
 - 1) Average Compressive Strength of Three Consecutive Tests: Maximum 500 psi less than specified compressive strength.
 - c. Test one cylinder at seven days, and two cylinders at 28 days.
 - d. Retain one cylinder for 56 days for testing when requested by Architect/Engineer.
 - e. Dispose of remaining cylinders if testing is not required.
4. Slump, Temperature, and Air Content:
 - a. Measure for each compressive-strength concrete sample.
 - b. Slump: Comply with ASTM C143/C143M.

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- c. Air Content: Comply with ASTM C173/C173M.
- d. Temperature: Comply with ASTM C1064/C1064M.

5. Records:

- a. Maintain records of placed concrete items.
- b. Record date, location of pour, quantity, air temperature, number of test samples taken.

3.6 PROTECTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, rain and flowing water, and mechanical injury.
- C. Do not permit traffic over paving for minimum 7 days after finishing until 70 percent design strength of concrete has been achieved.
- D. Damaged Concrete:
 - 1. Remove and reconstruct concrete that has been damaged for entire length between scheduled joints.
 - 2. Refinishing damaged portion is not acceptable.
 - 3. Dispose of damaged portions.

3.7 ATTACHMENTS

- A. Concrete Sidewalks: 3000-psi 28-day concrete, 4 inches thick, buff color portland cement, exposed aggregate finish.

END OF SECTION

SECTION 32 17 23 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Traffic lines and markings.
2. Legends.
3. Paint.
4. Glass beads.

1.2 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:

1. AASHTO M247 - Standard Specification for Glass Beads Used in Pavement Markings.

B. ASTM International:

1. ASTM D34 - Standard Guide for Chemical Analysis of White Pigments.
2. ASTM D126 - Standard Test Methods for Analysis of Yellow, Orange, and Green Pigments Containing Lead Chromate and Chromium Oxide Green.
3. ASTM D562 - Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer.
4. ASTM D711 - Standard Test Method for No-Pick-Up Time of Traffic Paint.
5. ASTM D713 - Standard Practice for Conducting Road Service Tests on Fluid Traffic Marking Materials.
6. ASTM D1301 - Standard Test Methods for Chemical Analysis of White Lead Pigments.
7. ASTM D1394 - Standard Test Methods for Chemical Analysis of White Titanium Pigments.
8. ASTM D1475 - Standard Test Method for Density of Liquid Coatings, Inks, and Related Products.
9. ASTM D1640/D1640M - Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings.
10. ASTM D2202 - Standard Test Method for Slump of Sealants.
11. ASTM D2371 - Standard Test Method for Pigment Content of Solvent-Reducible Paints.
12. ASTM D2621 - Standard Test Method for Infrared Identification of Vehicle Solids From Solvent-Reducible Paints.
13. ASTM D2743 - Standard Practices for Uniformity of Traffic Paint Vehicle Solids by Spectroscopy and Gas Chromatography.
14. ASTM D4280 - Standard Specification for Extended Life Type, Nonplowable, Raised Retroreflective Pavement Markers.

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15. ASTM D4505 - Standard Specification for Preformed Retroreflective Pavement Marking Tape for Extended Service Life.

C. Mississippi State Department of Transportation

1. Mississippi Standard Specifications for State Aid Road and Bridge Construction, 2004 Edition.

1.3 SUBMITTALS

- A. Per Sections S-619, S-620, and S-621 of the Mississippi Standard Specifications for State Aid Road and Bridge Construction, 2004 Edition.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- C. Test and Evaluation Reports: Indicate source and acceptance test results according to AASHTO M247.
- D. Manufacturer Instructions:
 1. Submit instructions for application temperatures, eradication requirements, application rate, line thickness, type of glass beads, and bead embedment and application rate.
 2. Submit detailed instructions on installation requirements, including storage and handling procedures.

1.4 QUALITY ASSURANCE

- A. Per Sections S-619, S-620, and S-621 of the Mississippi Standard Specifications for State Aid Road and Bridge Construction, 2004 Edition.
- B. Maintain one copy of each standard affecting Work of this Section on Site.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Applicator: Company specializing in performing Work of this Section with minimum three years' documented experience.
- C. Per Sections S-619, S-620, and S-621 of the Mississippi Standard Specifications for State Aid Road and Bridge Construction, 2004 Edition.

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1.6 DELIVERY, STORAGE, AND HANDLING

- A. Per Sections S-619, S-620, and S-621 of the Mississippi Standard Specifications for State Aid Road and Bridge Construction, 2004 Edition.

1.7 AMBIENT CONDITIONS

- A. Per Sections S-619, S-620, and S-621 of the Mississippi Standard Specifications for State Aid Road and Bridge Construction, 2004 Edition.
- B. Do not apply materials if surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.
- C. Do not apply exterior coatings during rain or snow if relative humidity is outside range required by paint manufacturer, or if moisture content of surfaces exceeds that required by paint manufacturer.
- D. Minimum Conditions: Do not apply paint if temperatures are expected to fall below [60] [50] deg. F within 24 hours after application.
- E. Thermoplastic Compound: Do not apply unless pavement surface temperature is minimum 40 deg. F and rising.
- F. Maximum VOCs: Do not exceed limit required by State or Environmental Protection Agency.

1.8 WARRANTY

- A. Furnish one-year manufacturer's warranty for pavement markings.

PART 2 - PRODUCTS

2.1 PAINTED PAVEMENT MARKINGS

- A. Per Sections S-619, S-620, and S-621 of the Mississippi Standard Specifications for State Aid Road and Bridge Construction, 2004 Edition.

2.2 APPLICATION EQUIPMENT

- A. Continuous Longitudinal Line Application Machine: Use application equipment with following capabilities.

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1. Dual nozzle paint gun to simultaneously apply parallel lines of indicated width in solid or broken patterns or various combinations of those patterns.
2. Pressurized bead-gun to automatically dispense glass beads onto painted surface, at required application rate.
3. Measuring device to automatically and continuously measure length of each line placed, to nearest foot.
4. Device to heat paint per manufacturer's specifications for fast dry applications.

B. Machine Calibration:

1. Paint Line Measuring Device: Calibrate automatic line length gauges to maintain tolerance of plus or minus **25** feet per mile.
2. Cycle Length/Paint Line Length Timer: Calibrate cycle length to maintain tolerance of plus or minus 6 inches per 40 feet; calibrate paint line length to maintain tolerance to plus or minus 3 inches per 10 feet.
3. Paint Guns: Calibrate to simultaneously apply paint binder at uniform rates as specified with an allowable tolerance of plus or minus 1 mil.
4. Bead Guns: Calibrate to dispense glass beads simultaneously at specified rate. Check guns by dispensing glass beads into gallon container for predetermined fixed period of time. Verify weight of glass beads.

C. Other Equipment:

1. For application of crosswalks, intersections, stop lines, legends and other miscellaneous items by walk behind strippers, hand spray or stencil trucks, apply with equipment meeting requirements of this section. Do not use hand brushes or rollers. Optionally apply glass beads by hand.

2.3 SOURCE QUALITY CONTROL

- A. Per Sections S-619, S-620, and S-621 of the Mississippi Standard Specifications for State Aid Road and Bridge Construction, 2004 Edition.

B. Owner Inspection:

1. Make completed paints and glass beads available for inspection at manufacturer's factory prior to packaging for shipment.
2. Notify Engineer at least seven days before inspection is allowed.

C. Owner Witnessing:

1. Allow witnessing of factory inspections and tests at manufacturer's test facility.
2. Notify Engineer at least seven days before inspections and tests are scheduled.

D. Certificate of Compliance:

1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.

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2. Specified shop tests are not required for Work performed by approved manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Per Sections S-619, S-620, and S-621 of the Mississippi Standard Specifications for State Aid Road and Bridge Construction, 2004 Edition.
- B. Do not apply paint to concrete surfaces until concrete has cured for 14 days.
- C. Agitate paint for 1 to 15 minutes prior to application to ensure even distribution of pigment.
- D. Maintenance and Protection of Traffic:
 1. Provide short-term traffic control as specified in Section 01 50 00 - Temporary Facilities and Controls.
 2. Prevent interference with marking operations and prevent traffic on newly applied markings before dry.
 3. Maintain travel lanes between 7:00 AM and 9:00 AM, and between 4:00 PM and 6:00 PM.
 4. Maintain access to existing businesses,, and other properties requiring access.
- E. Surface Preparation.
 1. Clean and dry paved surfaces prior to painting.
 2. Blow or sweep surface free of dirt, debris, oil, grease, or gasoline.
 3. Spot location of final pavement markings, as specified and as indicated on Drawings, by applying pavement spots 25 feet o.c.
 4. Request inspection by Architect/Engineer after placing pavement spots and minimum three days prior to applying traffic lines.

3.2 DEMOLITION

- A. Remove existing markings in an acceptable manner, using methods that will cause least damage to pavement structure or surface.
- B. Do not remove existing pavement markings by painting over with blank paint.
- C. Repair pavement or surface damage caused by removal methods.
- D. Clean and repair existing, remaining lines and legends.

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3.3 APPLICATION

- A. Per Sections S-619, S-620, and S-621 of the Mississippi Standard Specifications for State Aid Road and Bridge Construction, 2004 Edition.
- B. Painting:
 - 1. Apply paint pneumatically, using guidelines and templates as necessary to control application.
 - 2. Manually paint numbers, letters, and symbols.
 - 3. Prevent splattering and overspray when applying markings.
 - 4. Paint Guns: Simultaneously apply paint binder at uniform specified rates.
 - 5. Dispense at ambient temperature.
 - 6. Agitate paint for 1-15 minutes prior to application to ensure even distribution of paint pigment.
- C. Reflective Media:
 - 1. Immediately follow paint application.
 - 2. Bead Guns:
 - a. Dispense glass beads simultaneously at specified rate.
 - b. Check guns by dispensing glass beads into gallon container for predetermined fixed period of time.
 - c. Verify weight of glass beads.
- D. Thermoplastic Compound:
 - 1. Place on dry pavement.
 - 2. Apply centerline, skip line, edge line, and other longitudinal type markings with mobile applicator.
 - 3. Place special markings, crosswalks, stop bars, legends, arrows, and similar patterns with portable applicator.
- E. Raised Pavement Markers:
 - 1. Align prefabricated markers and permanently fix in place by means of epoxy adhesives.
 - 2. Prior to applying adhesive, thoroughly clean area by water blasting and by compressed air.
- F. Dimensions and Locations: As indicated on Drawings.
- G. Crosswalks, Intersections, Stop Lines, Legends:
 - 1. Use walk-behind strippers, hand spray, or stencil trucks.
 - 2. Do not use hand brushes or rollers.
 - 3. Glass beads may be applied by hand.

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3.4 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Requirements for tolerances.
- B. Maximum Variation from Wet Film Thickness: 1 mil.
- C. Maximum Variation from Wet Paint Line Width: Plus or minus 1/8 inch.
- D. Maximum variation from specified application temperature: Plus or minus 5 degrees F

3.5 FIELD QUALITY CONTROL

- A. Per Sections S-619, S-620, and S-621 of the Mississippi Standard Specifications for State Aid Road and Bridge Construction, 2004 Edition.
- B. Inspect for incorrect location, insufficient thickness, line width, coverage, retention, uncured or discolored material, and insufficient bonding.
- C. Acceptance:
 - 1. Repair lines and markings which after application and curing do not meet following criteria:
 - a. Incorrect location.
 - b. Insufficient thickness, width, coverage, or retention.
 - c. Uncured or discolored material.
 - d. Insufficient bonding.

3.6 CLEANING

- A. Per Sections S-619, S-620, and S-621 of the Mississippi Standard Specifications for State Aid Road and Bridge Construction, 2004 Edition.
- B. Collect and legally dispose of residues from painting operations.

3.7 PROTECTION

- A. Per Sections S-619, S-620, and S-621 of the Mississippi Standard Specifications for State Aid Road and Bridge Construction, 2004 Edition.
- B. Protect painted pavement markings from vehicular and pedestrian traffic until paint is dry and track free.

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- C. Unless material is track free at end of paint application convoy, use traffic cones to protect markings from traffic until track free.
- D. If vehicle crosses a marking and tracks it, or if splattering or overspray occurs, eradicate affected marking and resultant tracking and apply new markings.
- E. Follow manufacturer instructions or use minimum of 30 minutes of dry time.
- F. Barrier cones are satisfactory protection for materials being dried.

3.8 MAINTENANCE

- A. Per Sections S-619, S-620, and S-621 of the Mississippi Standard Specifications for State Aid Road and Bridge Construction, 2004 Edition.
- B. Provide service and maintenance of traffic paints for three years from date of Substantial Completion.

END OF SECTION 32 17 23

SECTION 32 92 20

SEEDING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Preparation of soil for seeding disturbed areas. Seeding and straw mulching are required at all areas of the site affected by construction activity.
- B. Seeding and fertilizing as required to control erosion.
- C. Seeding and fertilizing to establish permanent common Bermuda grassing at all areas of the site affected by construction activity which are not paved, built on, or sodded.

1.02 RELATED WORK

- A. Section 31 22 19 – Finish Grading

1.03 DELIVERY, STORAGE AND HANDLING

- A. Deliver grass seed in original containers showing analysis of seed mixture, percentage of pure seed, year of production, net weight, date of packaging and location of packaging. Damaged packages are not acceptable.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.04 EXISTING CONDITIONS

- A. Beginning work of this Section means acceptance of existing conditions.

PART 2 - PRODUCTS

2.01 GROWING MEDIA

- A. Topsoil: Natural, fertile agricultural soil capable of sustaining vigorous plant growth, not in frozen or muddy condition, containing not less than 6 percent organic matter, and corrected to pH value of 5.9 to 7.0. Free from subsoil slag, clay, stones, lumps, live plants, roots, sticks, crabgrass, coughgrass, noxious weeds, and foreign matter.
- B. Fertilizer: Grade 13-13-13 commercial type with 50 percent of the elements derived from organic sources.
- C. Threshed Straw: Free of Johnson grass, weed seed and noxious materials. Rate of spread: 40 bales per acre. Threshed straw required over all site areas where seeding is required. Minimum 1" thick, blown or spread and then watered down.
- D. Sand: Hard, granular natural beach sand, washed, free of impurities, chemical or organic matter.

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2.02 SEED

- A. The seed shall be of the best grade and of known vitality, purity and germination and shall be delivered in bags as required by law, each bag being tagged showing the percent of germination and purity of the seed, also, the percent of noxious weeds and inert litter. All seed shall be free of wild onion, Canada Thistle and Johnson Grass. One pound of seed shall not contain more than 300 noxious seeds. No seed more than one year old will be accepted. Seeding shall be done with grasses which will germinate in the season planted, as shown in the following table: (unless specified otherwise)

May - August 15	Bermuda Grass
August 16 - Sept. 15	Mix Bermuda/Rye
Sept. 16 - Feb. 15	Rye
Feb. 16 - May 1	Mix Bermuda/Rye

Bermuda grass seed shall be hulled; mixtures shall be 1.1 ratio by weight.

Note: Common Bermuda grass is considered permanent grass; rye grass is considered winter grass only. Permanent grass cover is required at site.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Protect existing underground improvements from damage.
- B. Remove foreign materials, plants, roots, stones, and debris from site. Do not bury foreign material.
- C. Remove contaminated subsoil.
- D. Cultivate all areas affected by construction to depth of 6 inches. Repeat cultivation areas where equipment has compacted subgrade.
- E. Execute grassing work as early as possible in the construction process to avoid erosion and to insure that a good stand of grass is present upon substantial completion of the work.

3.02 SPREADING TOPSOIL

- A. Spread topsoil to a depth of 2" over area to be seeded. Place during dry weather, and on dry unfrozen subgrade.
- B. Cultivate topsoil with mechanical tiller. Cultivate inaccessible areas by hand. Rake until surface is smooth. Break-up dirt clods that are larger than one inch in diameter.
- C. Remove from site foreign materials collected during cultivation.
- D. Grade to eliminate rough spots and low areas where ponding may occur. Maintain smooth, uniform grade.

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- E. Assure positive drainage away from buildings. Assure positive drainage towards drainage ditches and catch basins.

3.03 FERTILIZER

- A. Apply fertilizer at a rate of 10 lbs. per 1,000 sq. ft. (4.5 kg per 100 sq. m).
- B. Do not apply grass seed and fertilizer at same time, in same machine.
- C. Lightly water to aid breakdown of fertilizer and to provide moist soil for seed.

3.04 SEEDING

- A. Apply seed at a rate of 6 lbs. per 1,000 sq. ft. evenly in two intersecting directions. Rake in lightly.
- B. Do not sow immediately following rain, when ground is too dry, or during windy period.
- C. Roll seeded area with roller not exceeding 112 lbs. Apply materials to control erosion at banks scheduled to be seeded.
- D. Apply water with fine spray immediately after each area has been sown.
- E. Mulch all grassed areas with straw.

3.05 MAINTENANCE PERIOD

- A. Maintenance period: Contractor shall maintain site until the project is accepted by the Architect and Owner as substantially complete.

3.06 MAINTENANCE

- A. Maintain surfaces and supply additional topsoil where necessary, including areas affected by erosion. Furnish and install straw or hay to control erosion.
- B. Water to ensure uniform seed germination and to keep surface of soil damp.
- C. Apply water slowly so that surface of soil will not puddle and crust.
- D. Cut grass first time when it reaches height of 2 ½ inches and maintain to minimum height of 2 inches. Do not cut more than 1/3 of blade at any one mowing.
- E. After first mowing, water grass sufficiently to moisten soil from 3 inches to 5 inches.
- F. Apply weed killer (when weeds start developing) during calm weather when air temperature is above 50 degrees F.
- G. Replant damaged grass areas showing root growth failure, deterioration, bare or thin spots, or eroded areas.

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3.07 ACCEPTANCE

- A. Seeded areas will be accepted at end of maintenance period when seeded areas are properly established and otherwise acceptable.

3.08 REPAIRING

- A. Unaccepted areas requiring reseeding shall be so designated by the Architect. Reseeding shall be in compliance with the specifications herein and in accordance with the planting schedule.
- B. When grassed areas have become eroded, or otherwise damaged during the period of this contract, the affected areas shall be repaired to re-establish the surface and condition of the soil as provided for in these specifications. Such areas shall be reseeded as specified. Placing and reshaping of all earthwork shall be in accordance with the direction of the Architect.
- C. No additional payment will be made for refertilizing, reseeding or repairing eroded areas.

END OF SECTION

SECTION 32 92 23

SODDING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The Contractor shall furnish and install a 10'-0" sod apron at the exterior perimeter of the building and sidewalk concrete pavement and between the building and sidewalks.

1.02 RELATED WORK

- A. Section 31 22 19–Finish Grading
- B. Section 31 25 00 – Erosion and Sediment Control
- C. Section 32 92 19 – Seeding

PART 2 - PRODUCTS

2.01 TOPSOIL

- A. Topsoil: Reuse existing topsoil from site-stripping work or provide new. A minimum of 2" of topsoil is required.

2.02 SODDING

- A. Bermuda.
- B. All sod shall be nursery-grown, strongly rooted, uniformly sized, and machine-stripped not more than 24 hours prior to laying. Sod shall contain at least 85% permanent grass and not more than 10% weed and undesirable grasses and shall be of good texture and free from obnoxious roots, stones, and foreign materials. Sod shall be cut in 12" squares or 12" wide strips, uniformly 1½" thick with clean cut edges.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify site conditions and note irregularities affecting work of this Section. Insure that all below-grade utilities are in place and tested prior to initiating sodding work. Insure that clean-outs and other visible utilities are set flush with finish grade of sod.
- B. Beginning work of this Section means acceptance of existing conditions.

3.02 PREPARATION

- A. Eliminate uneven areas and low spots. Remove debris, roots, branches, gravel, and dirt clods. Spread topsoil evenly.

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- B. Scarify subgrade to depth of 6" where sodding is scheduled and relocated topsoil is installed. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.
- C. Finish-grade all areas affected by construction to catch basins and area drains.

3.03 INSTALLATION

- A. Cultivate subsoil to depth of 6" prior to installing sod.
- B. Roll sod and fix in place. Stake as necessary to maintain on slopes.
- C. Apply water and sand to sod to insure smooth and uniform grade.
- D. Maintain sod during construction period; apply water with a fine spray.

END OF SECTION

SECTION 33 01 10.58

DISINFECTION OF WATER UTILITY PIPING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Disinfection of potable water distribution system.
2. Testing and reporting of results.

B. Related Requirements:

1. Section 22 40 00 - Plumbing Fixtures: Disinfection of building domestic water piping systems.
2. Section 33 01 10.59 - Disinfection of Water Utility Storage Tanks: Water tank disinfection and bacteriological testing.
3. Section 33 14 16 - Site Water Utility Distribution Piping: Product and execution requirements for installation and testing of site domestic water distribution piping.
4. Section 33 11 13 - Potable Water Supply Wells: Product and execution requirements for installation, testing, and disinfection of water wells.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 01 20 00 - Price and Payment Procedures: Contract Sum/Price modification procedures.

B. Disinfection:

1. Basis of Payment: Includes preparing, disinfecting, testing, and reporting.

1.3 REFERENCE STANDARDS

A. American Water Works Association:

1. AWWA B300 - Hypochlorites.
2. AWWA B302 - Ammonium Sulfate.
3. AWWA B303 - Sodium Chlorite.
4. AWWA C651 - Disinfecting Water Mains.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

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- B. Disinfection Procedure:
 - 1. Submit description of procedure, including type of disinfectant and calculations indicating quantities of disinfectants required to produce specified chlorine concentration.
- C. Product Data: Submit manufacturer information for proposed chemicals and treatment doses.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Certify that final water complies with disinfectant quality standards of Mississippi Department of Health.
- F. Test and Evaluation Reports: Indicate testing results comparative to specified requirements.
- G. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- H. Qualifications Statements:
 - 1. Submit qualifications for manufacturer and applicator.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Disinfection Report:
 - 1. Type and form of disinfectant used.
 - 2. Date and time of disinfectant injection start and completion.
 - 3. Test locations.
 - 4. Name of person collecting samples.
 - 5. Initial and 24-hour disinfectant residuals in treated water in ppm for each outlet tested.
 - 6. Date and time of flushing start and completion.
 - 7. Disinfectant residual after flushing for each outlet tested.

1.6 QUALITY ASSURANCE

- A. Perform Work according to AWWA C651.
- B. Maintain one copy of each standard affecting Work of this Section on Site.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Applicator: Company specializing in performing Work of this Section with minimum three years' documented experience.

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PART 2 - PRODUCTS

2.1 DISINFECTION CHEMICALS

A. Chemicals:

1. Hypochlorite: Comply with AWWA B300.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify that piping system has been cleaned, inspected, and pressure tested.
- C. Verify that access fittings have been installed under Section 33 14 16 - Site Water Utility Distribution Piping.
- D. Perform scheduling and disinfecting activity with startup, water pressure testing, adjusting and balancing, and demonstration procedures, including coordination with related systems.

3.2 INSTALLATION

- A. Provide required equipment to perform Work of this Section.
- B. Introduce treatment into piping system.
- C. Maintain disinfectant in system for 24 hours.
- D. Flush, circulate, and clean until required disinfectant quality standard has been achieved using municipal domestic water.
- E. Replace permanent system devices that were removed for disinfection.

3.3 FIELD QUALITY CONTROL

A. Disinfection, Flushing, and Sampling:

1. Disinfect pipeline installation according to AWWA C651.
2. Use of liquid chlorine is not permitted.
3. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.

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4. Disposal:
 - a. Legally dispose of chlorinated water.
 - b. If chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.
5. After final flushing and before pipeline is connected to existing system or placed in service, certify that disinfectant level meets quality standards of authority having jurisdiction.

END OF SECTION

SECTION 33 05 61 – CONCRETE MANHOLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Modular precast concrete manholes and structures with tongue-and-groove joints and transition to cover frame, covers, anchorage, and accessories.
2. Bedding and cover materials.

1.2 DEFINITIONS

- ##### A. Bedding: Specialized material placed under manhole prior to installation and subsequent backfill operations.

1.3 PAYMENT

A. Concrete Manholes:

1. Basis of Payment: Includes excavating, backfilling, bedding, concrete foundation slab, concrete structure sections, cover frame and cover, to indicated depth, and forming and sealing of pipe inlets and outlets.

1.4 REFERENCE STANDARDS

A. American Association of State Highway Transportation Officials:

1. AASHTO M91 - Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale).
2. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
3. AASHTO M306 - Standard Specification for Drainage, Sewer, Utility, and Related Castings.

B. American Concrete Institute:

1. ACI 530/530.1 - Building Code Requirements and Specification for Masonry Structures.

C. ASTM International:

1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.

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2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM C32 - Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale).
4. ASTM C55 - Standard Specification for Concrete Building Brick.
5. ASTM C361 - Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.
6. ASTM C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections.
7. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
8. ASTM C877 - Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections.
9. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
10. ASTM C923 - Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
11. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
12. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
13. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

1.5 COORDINATION

- A. Coordinate Work of this Section with connection to City of Richland's infrastructure and trenching.

1.6 SUBMITTALS

- A. Shop Drawings:
 1. Indicate structure locations and elevations.
 2. Indicate sizes and elevations of piping, conduit, penetrations.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- C. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

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1.8 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- B. Handling: Comply with precast concrete manufacturer instructions and ASTM C913 for unloading and moving precast manholes and drainage structures.
- C. Storage:
 - 1. Store materials according to manufacturer instructions.
 - 2. Store precast concrete manholes and drainage structures to prevent damage to Owner's property or other public or private property.
 - 3. Repair property damaged from materials storage.
- D. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

1.9 AMBIENT CONDITIONS

- A. Cold Weather Requirements: Comply with ACI 530/530.1.

1.10 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

1.11 WARRANTY

- A. Furnish five-year manufacturer's warranty for concrete manholes.

PART 2 - PRODUCTS

2.1 CONCRETE AND MASONRY MANHOLES

- A. Manufacturers:
 - 1. Hanson Pipe & Precast.
 - 2. Substitutions: Approved equals.

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- B. Manhole Sections: Reinforced precast concrete in accordance with ASTM C478 with gasketed pipe openings in accordance with ASTM C923.
- C. Adjusting Rings: Precast rings or brick/mortar used to adjust elevation at top of cone section.
- D. Concrete Brick Units: ASTM C55; normal weight.
- E. Mortar and Grout: Composed of one-part Portland cement plus hydrated lime (10% of cement amount) mixed with two parts of masonry sand and water.
- F. Joint Gaskets (RAM-NECK “O” Ring Seal or Approved Equal): ASTM C-443, Federal Specifications SS-S00210 (210-A), AASHTO M-198.
- G. Joint Seals: All joints shall be covered with a thermos-adhesive wrap as manufactured by Wrapid Seal or approved equal.

2.2 FRAMES AND COVERS

- A. Manufacturers:
 - 1. East Jordan Iron Works.
 - 2. Substitutions: Approved Equals
- B. Description:
 - 1. Material:
 - a. Cast iron.
 - b. Comply with ASTM A48/A48M, Class 30B.
 - 2. Lid:
 - a. Bearing Surface: Machined flat.
 - b. Configuration: Removable.
 - c. Security: None.
 - 3. Cover Design: Open checkerboard grille molded with name “SEWER”.
 - 4. Live-Load Rating: to be H2O live load compliant.

2.3 COMPONENTS

- A. Manhole steps: Formed rungs; 1/2” diameter iron bar encapsulated with copolymer polypropylene plastic.
- B. Base Pad: Precast with Manhole Section.

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- C. Flexible Pipe Connectors (Boots): EPDM and Neoprene, 3/8" thick conforming to ASTM C-923, external stainless-steel connector bands conforming to ASTM A-167.
- D. Waterproofing and Anti-Microbial Additive: Xypex Bio-San C500 @ 1.0% of total cementitious content by weight, colored dye added to ensure detection.
- E. Interior Coatings: None, see note above.

2.4 CONFIGURATION

- A. Shaft Construction: Concentric with eccentric cone top sections; lipped male/female joints; sleeved to receive pipe sections.
- B. Shape: Cylindrical
- C. Clear Inside Dimensions: 48-inch diameter unless indicated otherwise on Construction Drawings.
- D. Design Depth: As indicated on Construction Drawings.
- E. Clear Cover Opening: 24 inches or as indicated on Construction Drawings.
- F. Pipe Entry: Furnish openings as indicated on drawings.
- G. Steps: 12" wide on 16" centers vertically set into manhole wall and as indicated on detail drawings.

2.5 BEDDING AND COVER MATERIAL

- A. Bedding: Native unless select material authorized by Engineer.
- B. Cover/Backfill: As specified in Section 33 31 11 for piping.

2.6 FINISHING STEEL

- A. Galvanizing: ASTM A123; hot dip galvanize after fabrication

2.7 RISER RINGS

- A. Riser Rings:
 - 1. Thickness of 4 to 6 inches:
 - a. Precast Concrete complying with ASTM C478
 - 2. Thickness less than 4 inches
 - a. Cast Iron complying with AASHTO M306
 - 3. Rubber Seal Wraps:

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- a. Wraps and Band Widths: Comply with ASTM C877 Type III.
 - b. Cone/Riser Ring Joint: Minimum 3-inch overlap
 - c. Frame/Riser Ring Joint: 2-inch overlap.
 - d. Additional Bands: Overlap upper band by 2 inches.
- B. Joint Sealant: Comply with ASTM C990
- C. Fasteners: Stainless Steel; ASTM F593.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that items provided by other Sections of Work are properly sized and located.
- B. Verify that built-in items are in proper location and are ready for roughing into Work.
- C. Verify that excavation base is ready to receive Work and excavations and that dimensions and elevations are as indicated on Drawings.

3.2 PREPARATION

- A. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers as indicated on Drawings to indicate its intended use.
- B. Coordinate placement of inlet and outlet pipe or duct sleeves as required by other Sections.
- C. Do not install manholes and structures where Site conditions induce loads exceeding structural capacity of manholes or structures.
- D. Inspect precast concrete manholes and structures immediately prior to placement in excavation to verify that they are internally clean and free from damage; remove and replace damaged units.

3.3 INSTALLATION

- A. Excavation and Backfill:
 - 1. Excavate for manholes and structures in location and to depth shown. Provide clearance around sidewalls of structure for construction operations.
 - 2. When groundwater is encountered, prevent accumulation of water in excavations. Place manholes and structure in dry trench.
 - 3. Where possibility exists of watertight structure becoming buoyant in flooded excavation, anchor structure to avoid flotation.

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- B. Place base pad, trowel top surface level.
- C. Place manhole and structure sections plumb and level, trim to correct elevations, anchor to base pad.
- D. Install manholes and structures supported at proper grade and alignment as shown in Drawings.
- E. Backfill excavation for manholes and structure in accordance with Section 31 23 16.
- F. Form and place manhole and structures cylinder plumb and level, to correct dimensions and elevations.
- G. Cut and fit for pipe, conduit, and sleeves.
- H. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour to form continuous drainage channel.
- I. Set cover frames and covers level without tipping, to correct elevations.
- J. Coordinate with other sections of work to provide correct size, shape, and location.
- K. Precast Concrete Manholes:
 - 1. Lift precast components at lifting points designated by manufacturer.
 - 2. When lowering manholes and structures into excavations and joining pipe to units, take precautions to ensure that interior of pipeline and structure remains clean.
 - 3. Assembly:
 - a. Assemble multi-section manholes and structures by lowering each section into excavation.
 - b. Install rubber gasket joints between precast sections according to manufacturer recommendations.
 - c. Lower, set level, and firmly position base section before placing additional sections.
 - 4. Remove foreign materials from joint surfaces and verify that sealing materials are placed properly.
 - 5. Maintain alignment between sections by using guide devices affixed to lower section.
 - 6. Joint sealing materials may be installed on Site or at manufacturer's plant.
 - 7. Verify that installed manholes and structures meet required alignment and grade.
 - 8. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe; fill annular spaces with mortar.
 - 9. Cut pipe flush with interior of structure.
 - 10. Shape inverts through manhole and structures as indicated on Drawings.
- L. Sanitary Manhole Drop Connections: As indicated on Drawings.
- M. Frame and Cover Installation:
 - 1. Set frames using mortar and masonry.

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2. Install radially laid concrete brick with 1/4-inch-thick, vertical joints at inside perimeter.
3. Lay concrete brick in full bed of mortar and completely fill joints.
4. If more than one course of concrete brick is required, stagger vertical joints.
5. Set frame and cover 2 inches above finished grade for manholes and other structures with covers located within unpaved areas to allow area to be graded away from cover beginning 1 inch below top surface of frame.

3.4 ADJUSTING

- A. Vertical Adjustment of Existing Manholes and Structures:
 1. If required, adjust top elevation of existing manholes and structures to finished grades as indicated on Drawings.
 2. Frames, Grates, and Covers:
 - a. Remove frames, grates, and covers cleaned of mortar fragments.
 - b. Reset to required elevation according to requirements specified for installation of castings.
 3. Reinforcing Bars:
 - a. Remove concrete without damaging existing vertical reinforcing bars if removal of existing concrete wall is required.
 - b. Clean vertical bars of concrete and bend into new concrete top slab or splice to required vertical reinforcement as indicated on Drawings.
 4. Clean and apply sand-cement bonding compound on existing concrete surfaces to receive cast-in-place concrete.

END OF SECTION 33 05 61

SECTION 33 05 76
FIBERGLASS MANHOLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fiberglass manholes.
2. Bedding and cover materials.

1.2 DEFINITIONS

- A. Bedding:** Specialized material placed under manhole prior to installation and subsequent backfill operations.
- B. FRP:** Fiberglass-reinforced plastic.
- C. HDPE:** High-density polyethylene.
- D. Fiberglass Manhole:**
1. Basis of Payment: Includes excavation, bedding, manhole, backfill, concrete, anchor, cover frame and cover, to indicated depth, and forming and sealing pipe of inlets and outlets.

1.3 REFERENCE STANDARDS

A. American Association of State Highway Transportation Officials:

1. AASHTO HB-17 - Standard Specifications for Highway Bridges.
2. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
3. AASHTO M306 - Standard Specification for Drainage, Sewer, Utility, and Related Castings.

B. ASTM International:

1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
2. ASTM A536 - Standard Specification for Ductile Iron Castings.
3. ASTM C581: Practice for Determining Chemical Resistance of Chemical Thermosetting Resins Used in Glass-Fiber Reinforced Structures Intended for Liquid Service.
4. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
5. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics.

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6. ASTM D2563 - Standard Practice for Classifying Visual Defects in Glass-Reinforced Plastic Laminate Parts.
7. ASTM D3753: Standard Specification for Glass-Fiber Reinforced Polyester Manholes and Wetwells.
8. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
9. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

1.4 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate Work of this Section with connection to municipal sewer utility service and trenching.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit manufacturer information for manhole covers, component construction, features, configuration, and dimensions.
- C. Shop Drawings:
 1. Indicate structure locations and elevations.
 2. Indicate sizes and elevations of piping, conduit, and penetrations.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- F. Source Quality-Control Submittals: Indicate results of shop tests and inspections.
- G. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- H. Qualifications Statement:
 1. Submit qualifications for manufacturer.

1.6 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of manholes and connections, and record invert elevations.

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1.7 QUALITY ASSURANCE

- A. Maintain one copy of each standard affecting Work of this Section on Site.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Handling: Comply with manhole manufacturer instructions for unloading, and moving precast manholes and drainage structures.
- D. Storage:
 - 1. Store materials according to manufacturer instructions.
 - 2. Store manholes to prevent damage to Owner's property or other public or private property.
 - 3. Repair property damaged from materials storage.
- E. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Take precautions to prevent damage to interior or exterior surfaces when handling.
 - 3. Provide additional protection according to manufacturer instructions.

1.10 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

1.11 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
- B. Furnish five-year manufacturer's warranty for fiberglass manholes.

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PART 2 - PRODUCTS

2.1 FIBERGLASS MANHOLES

1. Furnish materials according to ASTM D3753.

B. Description:

1. Material: FRP resin.
2. Nominal Outer Diameter: As indicated on Drawings.

C. Performance and Design Criteria:

1. Load Rating:
 - a. Comply with ASTM D3753.
2. Chemical Resistance: Comply with ASTM C581 and D3753.
3. Flexural Strength (Conic Section):
 - a. Hoop: 18000 psi.
 - b. Axial: 10000 psi.
4. Flexural Strength (Cylindrical Section):
 - a. Hoop: 18,000 psi.
 - b. Axial: 10,000 psi.
5. Compressive Strength:
 - a. Comply with ASTM D695.

D. Surfaces:

1. Paint or other coatings will not be accepted.
2. Exterior: Free of blisters larger than 1/2 inch in diameter, delamination, and exposed fibers.
3. Interior: Resin-rich with no exposed fibers, crazing, delamination, blisters larger than 1/2 inch in diameter, and wrinkles greater than 1/4 inch in depth.

E. Bottom:

1. Material: Match type and grade as used in fiberglass manhole.
2. Furnish integral 3-inch-wide anchoring flange.
3. Invert and Bench: Factory installed, using noncorrosive materials encapsulated in minimum 1/4-inch-thick fiberglass.

F. Connections:

1. PVC sewer plain-end pipe attached to manhole with resin and glass-fiber-reinforced layup.
2. Pipe: Match sewer pipe.
3. Resin and Fiberglass Layup: Match type and grade as used in fiberglass manhole.

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4. Boots: Comply with ASTM C923.

2.2 FRAMES AND COVERS

A. Manufacturers:

1. East Jordan Iron Works

B. Description:

1. Material:

- a. Cast iron.
- b. Comply with ASTM A48/A48M, Class 30B.

***** [OR] *****

2. Material:

- a. Ductile iron.
- b. Comply with ASTM A536.

3. Lid:

- a. Bearing Surface: Machined flat.
- b. Configuration: Removable.
- c. Security: Lockable.

4. Cover Design: Closed Waterproof.
5. Loading: Non-traffic.
6. Furnish sealing gasket.
7. Grate: Bicycle safe.

2.3 MATERIALS

- A. Resin: Furnish UV inhibitors.
- B. Reinforcing Material: Glass mat, Grade E.
- C. Laminate: Multiple layers of glass matting and resin.
- D. Bedding: 610 Crushed Stone

2.4 ACCESSORIES

- A. Steps:

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1. Rungs: Formed HDPE.
2. Diameter: 3/4 inch.
3. Width:
 - a. 12 inches.
4. Spacing:
 - a. 16 inches o.c. vertically, set into structure wall.

B. Fasteners: Stainless steel; ASTM F593.

C. Geotextile Filter Fabric:

1. Description:
 - a. Non-biodegradable.
 - b. Nonwoven.
2. Comply with AASHTO M288.
3. Class: A.

2.5 SOURCE QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for testing, inspection, and analysis.

B. Inspection and Testing:

1. Provide shop inspection and testing of completed assembly.
2. Maintain testing records and submit to Architect/Engineer.
3. Inspection: Comply with ASTM D2563 for allowable tolerance based on defect.
 - a. Pinholes or Pores in Laminate Surface: None.
 - b. Exposed Glass: None.
 - c. Exposure of Cut Edges: None.
 - d. Scratches: None greater than 0.002 inch deep.
 - e. Foreign Matter: None.
4. Testing:
 - a. Test with water or air.
 - b. Hydrostatic Test:
 - 1) Filling manhole with water and check for leaks.
 - 2) Minimum Test Duration: One hour.
 - c. Air Test: 2 to 5 psig for 30 minutes.

C. Owner Inspection:

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1. Make completed fiberglass manhole available for inspection at manufacturer's factory prior to packaging for shipment.
2. Notify Owner at least seven days before inspection is allowed.

D. Owner Witnessing:

1. Allow witnessing of factory inspections and tests at manufacturer's test facility.
2. Notify Owner at least seven days before inspections and tests are scheduled.

E. Certificate of Compliance:

1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.
2. Specified shop tests are not required for Work performed by approved manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify that items provided by other Sections of Work are properly sized and located.
- C. Verify that built-in items are in proper location and are ready for roughing into Work.
- D. Verify correct size of manhole and structure excavation.
- E. Verify that excavation base is ready to receive Work and excavations and that dimensions and elevations are as indicated on Drawings.

3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Mark each manhole with waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers as indicated on Drawings to indicate its intended use.
- C. Coordinate placement of inlet and outlet pipe as required by other Sections.
- D. Do not install manholes where Site conditions induce loads exceeding structural capacity of manholes or structures.
- E. Inspect manholes immediately prior to placement in excavation to verify that they are internally clean and free from damage; remove and replace damaged units.

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3.3 INSTALLATION

- A. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface structures or utilities in immediate or adjacent areas.
- B. Correct over-excavation with fine aggregate.
- C. Remove large stones or other hard matter impeding consistent backfilling or compaction.
- D. Protect manhole from damage or displacement while backfilling operation is in progress.
- E. Excavating:
 - 1. As specified in Section 312316 - Excavation and in indicated locations and depths.
 - 2. Provide clearance around sidewalls of manhole for construction operations , granular backfill.
 - 3. If ground water is encountered, prevent accumulation of water in excavations; place manhole in dry trench.
 - 4. Where possibility exists of watertight manhole becoming buoyant in flooded excavation, anchor manhole to avoid flotation as approved by Architect/Engineer.
- F. Base and Alignment: Place foundation slab and trowel top surface level.
- G. Bedding:
 - 1. Place bedding material at trench bottom, and level materials in continuous layer not exceeding 8 inches.
 - 2. Compact bedding material to 95 percent maximum density.
 - 3. Maintain optimum moisture content of bedding material to attain required compaction density.
- H. Base Pad:
 - 1. Form and place cast-in-place concrete base pad with provision for sewer pipe end sections.
 - 2. Place manholes plumb and level and anchor to foundation slab.

3.4 FIELD QUALITY CONTROL

- A. Equipment Acceptance: Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.

3.5 ATTACHMENTS

- A. Manholes: Fiberglass construction, HDPE steps, not less than 48-inch inside dimension, to depth indicated, with bolted lid.

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END OF SECTION

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SECTION 33 11 17 – WATER DISTRIBUTION PIPING - POLYVINYL CHLORIDE (PVC)

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe and fittings for water line including domestic water line,.
2. Underground pipe markers.
3. Bedding and cover materials.
4. Tracer wire and test stations

1.2 PRICE AND PAYMENT PROCEDURES

A. Pipe :

1. Basis of Measurement: By the linear foot of each size and type of PVC pipe listed on the bid form.
2. Basis of Payment: Includes hand trimming, excavation, pipe, bedding, backfilling, fittings, restrained joints, tracer wire, bolts, and mega lugs.

1.3 REFERENCE STANDARDS

A. ASTM International:

1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
2. ASTM D1785 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
3. ASTM D2241 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
4. ASTM D2466 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
5. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
6. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
7. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.

B. American Water Works Association:

1. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in., for Water Distribution.
2. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 in. through 3 in., for Water Service.

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1.4 SUBMITTALS

- A. Product Data: Submit data on pipe materials, pipe fittings, valves and accessories.
- B. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

- A. Pipe: Manufacturer's name, pressure rating, manufacturing conformance designations marked on pipe.
- B. Fittings: Manufacturer's names and model marked on fitting.
- C. Restraining Joints: Manufacturer's names and model marked on packaging.
- D. Underground Pipe Markers: Manufacturer's name marked on packaging.

1.7 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.1 WATER PIPING

- A. PVC Pipe: AWWA C900 Class:
 - 1. Fittings: AWWA C153, Mechanical Joint Ductile Iron
 - 2. Joints: ASTM D3139 compression gasket ring.
 - 3. All PVC pipe shall be marked with an NFS stamp.

2.2 RESTRAINED JOINTS

- A. Integral Ductile Iron: ANSI/AWWA C153/A21.53
- B. External: Tested in accordance with AWWA C600 and ASTM D2774.

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2.3 UNDERGROUND PIPE MARKERS

- A. Trace Wire: Electronic detection materials for non-conductive piping products.
 - 1. Unshielded 10 gage direct burial insulated solid copper wire.

2.4 BEDDING AND BACKFILL MATERIALS

- A. Bedding: Fill Type native.
- B. Backfill: Fill Type native.
- C. Concrete for Thrust Restraints:

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify building service connection and municipal utility water main size, location, and invert are as indicated on Drawings.

3.2 PREPARATION

- A. Construction Requirements: All water mains shall be laid a minimum of thirty-six inches (36") below natural grade unless otherwise stated on the plans. Where conflicts arise with other utilities adjustments in the water line may be made but only with the Engineer's approval. The trench shall be of sufficient width to allow the pipe to be placed in the trench without binding on the trench walls. However, the maximum trench width shall be five (5') feet unless approved by Engineer. Any trench width in excess of the five (5') feet maximum without the approval of Engineer will be backfilled at Contractor's expense. The trench shall be backfilled with fine, loose dirt free of large clods, stones, or debris. Select backfill shall be used to backfill the trench under all driving surfaces or as directed by Engineer. No more than 200 feet of trench may be open at one time and under no circumstances will any trench be left open overnight. All pipe shall be installed using Type 1 laying conditions, as shown on the Construction Drawings. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with flanges or unions.

3.3 BEDDING

- A. Form and place concrete for pipe thrust restraints at change of pipe direction. Place concrete to permit full access to pipe and pipe accessories.

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- B. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6 inches compacted depth; compact to 95 percent.
- C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact to 95 percent.
- D. Maintain optimum moisture content of fill material to attain required compaction density.

3.4 INSTALLATION - PIPE

- A. Group piping with other site piping work whenever practical.
- B. Install pipe to indicated elevation to within tolerance of 5/8 inches.
- C. Install ductile iron piping and fittings to AWWA C600.
- D. Route pipe in straight line.
- E. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- F. Install access fittings to permit disinfection of water system performed under Section 33 13 00.
- G. Form and place concrete for thrust restraints at each elbow or change of direction of pipe main.
- H. Establish elevations of buried piping with not less than 3 ft of cover.
- I. Install trace wire continuous over top of pipe. above pipe line;
- J. While under construction, unattended exposed pipelines must have ends capped.

3.5 TIE-INS

- A. A tie-in to existing main three inches (3") in diameter and larger shall consist of a tee, any spool pieces, and all other fittings and materials and labor necessary to properly make the interconnection of the proposed and an existing pipe. Restrained joint fittings shall be installed at all tie-ins. Where "Hot" tie-ins are indicated on the Construction Drawings, the Contractor shall tap the live, existing main without interrupting service through the use of a tapping sleeve/valve.

3.6 FIELD QUALITY CONTROL

- A. Pressure test system in accordance with AWWA C600 and the following:
 - 1. Test Pressure: Not less than 150 psi or 50 psi in excess of maximum static pressure, whichever is greater.
 - 2. Conduct hydrostatic test for at least twenty four hour duration.
 - 3. Fill section to be tested with water slowly, expel air from piping at high points. Install corporation cocks at high points. Close air vents and corporation cocks after air is expelled. Raise pressure to specified test pressure.

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4. Observe joints, fittings and valves under test. Remove and renew cracked pipe, joints, fittings, and valves showing visible leakage. Retest.
5. Maintain pressure within plus or minus 5.0 psig of test pressure. Leakage is defined as quantity of water supplied to piping necessary to return pressure to original test pressure.
6. Compute maximum allowable leakage by the following formula:

$L = (SD\sqrt{P})/C$
L = testing allowance, in gallons per hour
S = length of pipe tested, in feet
D = nominal diameter of pipe, in inches
P = average test pressure during hydrostatic test, in psig
C = 148,000
When pipe under test contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each size.

7. When test of pipe indicates leakage greater than allowed, locate source of leakage, make corrections and retest until leakage is within allowable limits. Correct visible leaks regardless of quantity of leakage.

B. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

END OF SECTION 33 11 17

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SECTION 33 12 16 - WATER DISTRIBUTION GATE VALVES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Valves.
 - 2. Valve boxes.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Valves:
 - 1. Basis of Measurement: Each.
 - 2. Basis of Payment: Includes excavation, valve, valve box, accessories, tests, and backfill.

1.3 REFERENCES

- A. American Water Works Association:
 - 1. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
 - 2. AWWA C509 - Resilient-Seated Gate Valves for Water-Supply Service.
 - 3. AWWA C550 - Protecting Epoxy Interior Coating for Valves and Hydrants.
 - 4. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
- B. National Sanitation Foundation:
 - 1. NSF 61 - Drinking Water System Components - Health Effects

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawing:
 - 1. Installation Plan: Submit description of proposed installation.
- C. Design Data: Submit manufacturer's latest published literature include illustrations, installation instructions, maintenance instructions and parts lists.
- D. Manufacturer's Certificates: Submit Statement of Compliance, supporting data, from material suppliers attesting that valves and accessories provided meet or exceed AWWA Standards and specification requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of valves.

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- C. Provide Operation and Maintenance Data for valves.

1.6 QUALITY ASSURANCE

- A. Perform work in accordance with **[[State] [Municipality] of <_____> [Highways] [Public Work's] standard.]**
- B. Maintain **[one copy]** **[<_____> copies]** of **[each]** document on site.

1.7 QUALIFICATIONS

- A. Manufacturer: company specializing in manufacturing Products specified in this section with minimum **[three]** **<_____>** years **[documented]** experience.
- B. Installer: Company specializing in performing work of this section **[with minimum <_____> years [documented] experience] [approved by manufacturer]**.

1.8 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation Meeting.
- B. Convene minimum **[one]** **<_____>** week prior to commencing work of this section.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing and protecting products.
- B. Prepare valves and accessories for shipment according to AWWA Standards and seal valve and ends to prevent entry of foreign matter into product body.
- C. Store products in areas protected from weather, moisture, or possible damage; do not store products directly on ground; handle products to prevent damage to interior or exterior surfaces.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.

1.11 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate work with **[[State] [Municipality] of <_____> [Highways] [Public Work's] standards]** and utilities within construction area.

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1.12 MAINTENANCE MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance materials.
- B. Furnish one tee wrench to Owner; required length.

PART 2 PRODUCTS

2.1 SUSTAINABILITY CHARACTERISTICS

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design compliance.
- B. Materials and Resources Characteristics:
 - 1. Recycled Content Materials: Furnish materials with maximum available recycled content **[including:]** [.]
 - a. < _____ >
 - 2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site **[including:]** [.]
 - a. < _____ >

2.2 RESILIENT WEDGE GATE VALVES

- A. Manufacturers:
 - 1. Mueller
- B. Resilient Wedge Gate Valves: AWWA C509; iron body, bronze or ductile iron; including the manufacturer's name, pressure rating, and year of fabrication cast into valve body.
 - 1. Resilient seats.
 - 2. Stem: Non-rising bronze stem.
 - 3. Operating Nut: Square; open counterclockwise unless otherwise indicated.
 - 4. Ends: Flanged, mechanical joint or bell end connections.
 - 5. Coating: AWWA C550; interior/exterior.
 - 6. Sizes 12 inch diameter and smaller: 200 psig.
 - 7. Sizes 16 inch diameter and larger: 150 psig.

2.3 VALVE BOXES

- A. 12 inch diameter Valves and Smaller: Domestic cast iron, two-piece, screw type.
- B. Valves Larger than 12 inch diameter: Domestic cast iron, three-piece, screw type; round base.
- C. Cast iron lid, marked "Water".

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2.4 ACCESSORIES

- A. Concrete for Thrust Restraints: Concrete type specified in Section [03 30 00] <_____>.
- B. Valve Box Aligner: High-strength, plastic device designed to automatically center valve box base and prevent valve box base from shifting off center during backfilling.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Determine exact location and size of valves from Drawings; obtain clarification and directions from Architect/Engineer prior to execution of work.
- C. Verify invert elevations prior to excavation and installation of valves.

3.2 PREPARATION

- A. Identify required lines, levels, contours and datum locations.
- B. Locate, identify, and protect utilities to remain from damage.
- C. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.
 - 1. Notify Architect/Engineer not less than <_____> days in advance of proposed utility interruption.
 - 2. Do not proceed without written permission from the Architect/Engineer.
- D. Perform trench excavation, backfilling and compaction in accordance with Section 31 23 16.

3.3 INSTALLATION

- A. Install valves in conjunction with pipe laying; set valves plumb.
- B. Provide buried valves with valve boxes installed flush with finished grade.

3.4 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Flush and disinfect system in accordance with Section 33 13 00.

3.5 FIELD QUALITY CONTROL

- A. Section [01 40 00 - Quality Requirements] [01 70 00 - Execution and Closeout Requirements]:
Field inspecting, testing, adjusting, and balancing.

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- B. Perform pressure test on domestic site water distribution system in accordance with AWWA C600.

SECTION 33 31 23

SANITARY SEWERAGE FORCE MAIN PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Force mains.
2. Bedding and cover materials.

1.2 PAYMENT

A. Pipe and Fittings:

1. Basis of Payment: Includes excavation , hand trimming, backfill, bedding, thrust restraints, pipe and fittings.

1.3 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:

1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. American Water Works Association:

1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
2. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
3. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
4. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.
5. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution.

C. ASTM International:

1. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³).
2. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³).
3. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

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4. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
5. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
6. ASTM D2467 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
7. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.4 COORDINATION

- A. Coordinate Work of this Section with connection to existing municipal sewer utility service.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer information indicating pipe material used, pipe accessories, valves.
- B. Shop Drawings:
 1. Indicate piping piece numbers and locations.
 2. Indicate restrained joint locations.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for restrained joints, including establishing lengths of restrained joint piping required.
- E. Manufacturer Instructions: Submit special procedures required to install specified products.
- F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- G. Qualifications Statement:
 1. Submit qualifications for manufacturer, installer, and licensed professional.

1.6 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record invert elevations and actual locations of pipe runs and connections.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

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1.7 QUALITY ASSURANCE

- A. Perform Work according to MDEQ standards.
- B. Maintain one copy of each standard affecting Work of this Section on Site.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Storage:
 - 1. Store materials according to manufacturer instructions.
 - 2. Do not place materials on private property without written permission of property owner.
 - 3. Do not stack pipe higher than recommended by pipe manufacturer.
- D. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Store gaskets for mechanical and push-on joints in cool and dry location, out of direct sunlight, and not in contact with petroleum products.
 - 3. Provide additional protection according to manufacturer instructions.

1.10 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

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PART 2 - PRODUCTS

2.1 FORCE MAIN

2.2 HDPE PIPE

A. HDPE Pressure Sewer Pipe and Fittings, 12-Inch Nominal Size and Smaller:

1. Comply with ASTM D3035.
2. SDR: 11.

2.3 MATERIALS

A. Bedding and Cover:

1. Bedding: 610 Crushed Stone
2. Cover: Fill Type: CL Material
3. Soil Backfill from above Pipe to Finish Grade: Native
4. Subsoil: No rocks more than 6 inches in diameter, frozen earth, or foreign matter.

2.4 ACCESSORIES

A. Pipe Location Tracer Wire: 10 Gauge Tracer Wire

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that trench cut is ready to receive Work.
- B. Verify that excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

- A. Correct over-excavation with fine aggregate.
- B. Remove large stones or other hard matter capable of damaging pipe or of impeding consistent backfilling or compaction.

3.3 INSTALLATION

A. Bedding:

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1. Place bedding material at trench bottom.
2. Level materials in continuous layers not exceeding 8 inches in depth.
3. Maintain optimum moisture content of bedding material to attain required compaction density.

B. Piping:

1. Install pipe, fittings, and accessories as indicated on Drawings.
2. Route piping in straight line.
3. Install bedding at sides and over top of pipe to minimum compacted thickness of 12 inches.
4. Backfilling and Compacting:
 - a. Do not displace or damage pipe while compacting.
5. Connect to municipal sewer system as shown on the drawings.

C. Thrust Restraints:

1. Provide pressure pipeline with restrained joints or concrete thrust blocking at pumps, bends, tees, and changes in direction.

D. Cradles and Encasements: Provide concrete cradles and encasements for pipelines where indicated on Drawings.

3.4 FIELD QUALITY CONTROL

A. Inspections: Request inspection by Architect/Engineer prior to and immediately after placing bedding.

B. Pressure Testing:

1. Pressure:
 - a. Not less than 150 psi in excess of maximum static pressure, whichever is greater.
 - b. Maintain pressure within plus or minus 5 psi of test pressure.
2. Time: Conduct test for minimum of two hours.
3. Initial Procedure:
 - a. Install corporation cocks at high points.
 - b. Slowly fill section to be tested with water, expelling air from piping at high points from air vents and by opening corporation cocks.
 - c. Close air vents and corporation cocks after air is expelled.
 - d. Raise pressure to specified test pressure.
4. Testing:
 - a. Observe joints, fittings, and valves under test.
 - b. Remove and replace cracked pipes, joints, fittings, and valves showing visible leakage.

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- c. Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate.

5. Leakage:

- a. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of test.
- b. Maximum Allowable Leakage:
 - 1) $L = SD \times \sqrt{P}/C$.
 - 2) L = testing allowance, gph.
 - 3) S = length of pipe tested, feet.
 - 4) D = nominal diameter of pipe, inches.
 - 5) P = average test pressure during hydrostatic test, psig.
 - 6) C = 148,000.
- c. If pipe under test contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each size.
- d. If test of pipe indicates leakage greater than allowed, locate source of leakage, make corrections, and retest until leakage is within allowable limits.
- e. Correct visible leaks regardless of quantity of leakage.

C. Compaction Testing:

- 1. Comply with ASTM D698.

3.5 PROTECTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 33 32 17 – WASTEWATER PUMPING STATIONS - GRINDER

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes grinder wastewater pumping stations in fiberglass reinforced plastic basins for use in conjunction with gravity sewers or low pressure sewer systems.

1.2 PAYMENT

- A. Wastewater Pumping Station - Grinder:
 - 1. Basis of Payment: Includes site clearing and grubbing, excavation, backfill, fiberglass wet well pre cast concrete wet well, wet well cover, pumps, piping, valves, lift-out rail system, controls and wiring, appurtenances, testing, and site restoration.

1.3 REFERENCES

- A. American Bearing Manufacturers Association:
 - 1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- B. ASTM International:
 - 1. ASTM A48 – Standard Specifications for Gray Iron Castings
 - 2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 3. ASTM D3299-10 – Standard Specification For Filament Wound Glass Fiber Reinforced Thermoset Resin Corrosion Resistant Tanks.
- C. National Electrical Manufacturers Association:
 - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.4 PERFORMANCE REQUIREMENTS

- A. Pump Requirements: Per construction drawings

1.5 SUBMITTALS

- A. Shop Drawings:
 - 1. Submit detailed dimensions for materials and equipment, including wet wells, pumps, piping, controls and wiring schematics and accessories.
- B. Product Data: Submit information concerning materials of construction and fabrication.
- C. Manufacturer's Installation Instructions: Submit detailed instructions on installation requirements including storage and handling procedures, anchoring, and layout.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

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- E. Manufacturer's Field Reports: Certify equipment has been installed in accordance with manufacturer's instructions.

1.6 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations and final orientation of equipment and accessories.
- B. Operation and Maintenance Data:
 - 1. Submit maintenance instructions for equipment and accessories.
 - 2. Furnish list of equipment and tools needed to maintain and calibrate equipment.
 - 3. Recommended spare parts inventory.

1.7 QUALITY ASSURANCE

- A. Maintain one copy of each document on site.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum 3 years documented experience approved by manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Prepare pumps and accessories for shipment to prevent entry of foreign matter into product body.
- B. Inspect for damage.
- C. Store products in areas protected from weather, moisture, or possible damage. Do not store products directly on ground.
- D. Handle products to prevent damage to interior or exterior surfaces.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface structures or utilities, in immediate or adjacent areas.

1.11 COORDINATION

- A. Coordinate work with Municipality of Woodville Public Work's and utilities within construction area.

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PART 2 PRODUCTS

2.1 GRINDER PUMP MANUFACTURERS

1. Per construction drawings

2.2 CENTRIFUGAL TYPE GRINDER PUMPS

- A. Submersible grinder pumps, field serviceable.
- B. ASTM A-48, Class 30 cast iron pump case, motor housing, and bearing housing.
- C. Integral solid 400 Series stainless steel motor and pump shaft; Type 316 stainless steel hardware.
- D. External mating parts machined and sealed with Buna-N Rubber O-rings on a beveled edge.
- E. Bearings: permanently lubricated by dielectric oil
 1. Upper: single row, ball, radial.
 2. Lower: single row, ball, thrust.
- F. Impeller:
 1. Thermoplastic polyester resin, Valox with permanently molded, hexagonally locked bronze insert.
 2. Five vane, semi-open design.
 3. Hydrodynamic sealing vanes on rear shroud.
 4. Dynamically balanced impeller.
 5. Non-overloading over entire pump curve.
- G. Cutter Assembly:
 1. Positioned immediately below pumping element and direct driven by motor shaft.
 2. No exposed shaft.
 3. Cut particles to maximum dimension of 1/4".
 4. Two stage cutter assembly: rotating stage cuts perpendicular to stationary stage.
 5. Both cutters constructed of 440C stainless steel hardened to Rockwell 60C.
 6. Both upper (axial) and stationary cutter capable of being reversed to provide sharp, unused cutting edges when original edges become dull.
 7. Cutter assembly removable without dismantling pump.
 8. Stationary (lower) cutter ring pressed into suction opening of volute and secured by minimum of three (3) 300 series stainless steel screws.
 9. Rotating (axial) upper cutter secured to end of combination pump/motor shaft by 300 series stainless steel washer and 300 series stainless steel flat head cap screw.
- H. Heat sensors:
 1. Low resistance, bi-metal disc, open at 120°C, automatically reset at 30-35°C.
 2. Connected to motor starter coil to trip starter if sensor opens.
- I. Coating: All exterior surfaces coated with reducible air dry enamel after final pump assembly.

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2.3 PUMP MOTORS

- A. Sealed submersible; open windings operating in dielectric oil; motor leads potted in epoxy compound to form leak proof seal.
- B. Class F insulation on stator windings.
- C. NEMA B design (3-phase); NEMA L design (single phase).
- D. Designed to operate partially or completely submerged in liquid being pumped.
- E. Cooled by liquid being pumped.
- F. Stators held in place with removable end ring and threaded fasteners; field removable without use of heat or press.
- G. No special tools required for motor/pump disassembly.
- H. Tandem Type 21 carbon/ceramic mechanical shaft seals with oil chamber between seals.
- I. Electrode mounted between seals to detect water leaking into seal chamber and actuate light on control panel.
- J. Upper and lower ball bearings to support rotor; lower bronze sleeve or ball bearing to take radial loads from impeller; minimum ball bearing, ABMA 9, B-10 life of 15,000 hours.
- K. Starter equipped with overload heaters so normal overloads are protected by external heater block.
- L. Electrical Power/Control Cord:
 - 1. SOW/SOW-A water resistant, 600 V, 60 degree C, U.L. and C.S.A. approved, single cord to incorporate power and sensor leads; minimum of seven (7) twelve (12) gauge conductors.
 - 2. Compression fitting and epoxy potted at pump housing entry to prevent entrance of moisture by wicking or capillary action.
 - 3. Power cord connection to motor leads with extra heavy duty crimped, copper insert, wire-to-wire connector.

2.4 PUMP DISCHARGE PIPING

- A. Schedule 40, Type 304 stainless steel.
- B. Check Valve: cast iron ball type.
- C. Include brass quick disconnect and stainless steel union per drawings.
- D. Gate Valve: brass with stainless steel operating handle extension per drawings.

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2.5 PUMP BASIN (WET WELL)

- A. Basin: Fiberglass reinforced polyester resin, nominal 0.25 inches wall thickness.
- B. Designed to withstand backfill material with density of 120 pounds per cubic foot with safety factor of 2.
- C. Bottom designed to withstand hydrostatic uplift with no deflection and safety factor of 2.
- D. Anti-Flotation Ring: Formed integral with basin.
- E. Provide top flange, minimum 2" wide, for cover attachment.
- F. Cover: Aluminum tread plate, 1/4" minimum thickness, minimum live load of 550 pounds per square foot; lift handles and padlock provisions included; include access hatch for pump installation and removal; attach to top basin flange with stainless steel fasteners; provide watertight seal between cover and basin top flange.
- G. Inlet Pipe Connection: bolt-on, cast iron caulking type hub fastened to basin with stainless steel hardware; ship loose, connected in field.
- H. Conduit Connections: bolt-on cast iron or plastic connections, 2" diameter, watertight connection, stainless steel fasteners; number per drawings.
- I. Liquid Level Controls Suspension Bracket: Type 304 stainless steel, stainless steel fasteners, watertight connection, non-metallic cord retainers.
- J. Vent: screened; 2" O.D. aluminum vent assembly attached to cover or Schedule 40 PVC, 2" O.D. connected to basin wall with watertight connection, extending 6" above finished grade.

2.6 APPURTENANCES

- A. Pump Guide/Lift-out Rails: Stainless steel, Type 304, Schedule 40, diameter standard for pump size but not less than 1 inch; braced at 18" intervals, one piece, round.
- B. Top and Bottom Bracket Assembly: Type 304, stainless steel, 3/16" minimum thickness.
- C. Pump Guides and Guide Rail Supports: Stainless steel.
- D. Pump Lifting Cables: Type 316, stainless steel cable, 3/16" diameter.
- E. Fasteners and Hardware: Stainless steel, Type 316.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify layout and orientation of pumps, accessories, and piping connections.

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3.2 INSTALLATION

- A. Install pump units and accessories where indicated on Drawings and in accordance with manufacturer's instructions.
- B. Provide and connect piping, accessories, power and control conduit and wiring to make system operational, ready for startup.
- C. Flush piping with clean water.

3.3 FIELD QUALITY CONTROL

- A. Pre-operational Check: Before operating system or components, make the following checks:
 - 1. Check and adjust liquid level control and alarm settings.
- B. Start-up and Performance Testing:
 - 1. Test each unit on clear water through minimum of four complete cycles under supervision of manufacturer's representative and in presence of Architect/Engineer. Demonstrate system performance, control functions, and alarms meet specified requirements.
 - 2. Hydrostatically test system piping for leaks at 150 psig.
- C. Equipment Acceptance:
 - 1. Adjust, repair, modify or replace system components that fail to perform as specified and rerun tests. Make final adjustments to equipment under direction of manufacturer's representative.
 - 2. Document adjustments, repairs and replacements in manufacturer's field services certification.

3.4 MANUFACTURER'S FIELD SERVICES

- A. Furnish services of manufacturer's representative experienced in installation of products supplied under this specification for not less than 2 man-days on-site for installation inspection and field testing, and instructing Owner's personnel in maintenance of equipment.
- B. Certify that equipment has been properly installed and is ready for start-up and testing.

3.5 DEMONSTRATION

- A. Demonstrate equipment startup, shutdown, routine maintenance, alarm condition responses, and emergency repair procedures to Owner's personnel.

END OF SECTION

SECTION 33 42 13
STORMWATER CULVERTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete pipe culvert and End Sections.
2. Concrete box sections.
3. HDPE pipe culvert.
4. HP Storm Pipe Culvert
5. Bedding and cover materials.
6. Pile support systems.
7. Concrete encasement and cradles.
8. Slope protection at pipe end.

B. Related Requirements:

1. Section 31 23 23 - Excavation
2. Section 31 37 16 - Riprap

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 01 20 00 - Price and Payment Procedures: Contract Sum/Price modification procedures.

B. Reinforced Concrete Pipe:

1. Basis of Payment: Includes excavating, hand trimming, removing soft subsoil, bedding and fill, geotextile fabric, compacting, pipe, assembled fittings, accessories, and repair of damaged coating.

C. Reinforced Concrete Arch Pipe:

1. Basis of Payment: Includes excavating, hand trimming, removing soft subsoil, bedding and fill, geotextile fabric, compacting, pipe, assembled fittings, accessories, and repair of damaged coating.

D. Reinforced Concrete Pipe End Section:

1. Basis of Payment: Includes excavating, hand trimming, removing soft subsoil, bedding and fill, geotextile fabric, compacting, pipe, assembled fittings, and accessories.

E. Reinforced Concrete Arch Pipe End Section:

1. Basis of Payment: Includes excavating, hand trimming, removing soft subsoil, bedding and fill, geotextile fabric, compacting, pipe, assembled fittings, accessories, and repair of damaged coating.

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- F. HP Storm Pipe
 - 1. Basis of Payment: Includes excavating, hand trimming, removing soft subsoil, bedding and fill, geotextile fabric, compacting, pipe, assembled fittings, accessories, repair of damaged coating.
- G. HDPE Drainage Pipe
 - 1. Basis of Payment: Includes excavating, hand trimming, removing soft subsoil, bedding and fill, geotextile fabric, compacting, pipe, assembled fittings, accessories

1.3 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO M36 - Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains.
 - 2. AASHTO M86/M86M - Standard Specification for Nonreinforced Concrete, Sewer, Storm Drain, and Culvert Pipe.
 - 3. AASHTO M170 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - 4. AASHTO M196 - Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains.
 - 5. AASHTO M206/M206M - Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe.
 - 6. AASHTO M207/.
 - 7. AASHTO M252 - Standard Specification for Corrugated Polyethylene Drainage Pipe.
 - 8. AASHTO M259 - Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers.
 - 9. AASHTO M273 - Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers with Less Than 2 ft of Cover Subjected to Highway Loadings.
 - 10. AASHTO M278 - Standard Specification for Class PS46 Poly(Vinyl Chloride) (PVC) Pipe.
 - 11. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
 - 12. AASHTO M294 - Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm Diameter.
 - 13. AASHTO M304 - Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter.
 - 14. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg Rammer and a 457-mm Drop.
- B. ASTM International:
 - 1. ASTM A123/.
 - 2. ASTM A760/.
 - 3. ASTM B745/.
 - 4. ASTM C14 - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe.

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5. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
6. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
7. ASTM C506 - Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe.
8. ASTM C507 - Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe.
9. ASTM C1433 - Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers.
10. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³).
11. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³).
12. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.4 COORDINATION

- A. Coordinate Work of this Section with termination of storm sewer, trenching, connection to public storm sewer.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit manufacturer information regarding pipe, fittings, and accessories.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer Instructions: Submit special procedures required to install specified products.
- E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- F. Qualifications Statement:
 1. Submit qualifications for manufacturer.

1.6 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

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1.7 QUALITY ASSURANCE

- A. Maintain one copy of each standard affecting Work of this Section on Site.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Storage:
 - 1. Store materials according to manufacturer instructions.
 - 2. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
 - 3. Do not store pipe flat on ground.
 - 4. Store UV-sensitive materials out of direct sunlight.
- D. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Block individual and stockpiled pipe lengths to prevent moving.
 - 3. Cradle pipe to prevent point stress.
 - 4. Provide additional protection according to manufacturer instructions.

1.10 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PIPE CULVERT

- A. Reinforced Circular Concrete Pipe:

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1. Comply with AASHTO M170, Class III or IV
2. Reinforcement: Mesh.
3. Shape: Circular with nominal diameter of set forth in the bid form.
4. End Joints: Bell and Spigot or Tongue and Groove

B. Reinforced Concrete Arch Pipe:

1. Comply AASHTO M206/M206M, Class, III or IV.
2. Size: set forth in the bid form.
3. Joints: Comply with AASHTO M206/M206M.

C. HP Storm Pipe:

1. Comply with AASHTO M330.
2. Interior: Smooth lined.
3. Joints: Integral bell and spigot joint on all sizes and shall be watertight in accordance with ASTM D3212. Pipe Diameters of 18" and larger shall have a reinforced polymer band fused to the bell. The spigot shall have a gasket meeting the requirements of ASTM F477. The gaskets shall be installed by the pipe manufacturer and shall be covered with a removable, protective wrap to ensure the gaskets are free from debris.
4. The pipe manufacturing facility shall have demonstrated installed history with PP of more than five years and supply the pipe from a facility that is currently certified by AASHTO National Transportation Product Evaluation Program (NTPEP) for polypropylene pipe.

D. HDPE Culvert Pipe:

1. Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.
2. Comply with ASTM F2648.
3. Joints: Comply with ASTM F2648.

2.2 MATERIALS

A. Bedding and Cover for RCP and RCAP:

1. Bedding for Reinforced Concrete Pipe, Reinforced Concrete Arch Pipe and Flared End Section will be as follows:
 - a. The pipe shall be bedded to a depth of 50% of the diameter of the pipe and shall extend to 6 inches below the bottom of the pipe.
 - b. The bedding material will consist of a sandy soil that passes a 3/8" sieve and not more than 10 percent of which passes a No. 200 Sieve
2. The backfill above the bedding and above the concrete conduit shall meet the requirements of the borrow material approved to be used in the roadway section of the project.
 - a. If no approved borrow material is given in the project the backfill and cover material shall meet the requirements of a B9-10 as described in Section 70 3. 21 of the Mississippi Standard Specifications for Road and Bridge Construction.
 - b. Native material will be acceptable in locations where the pipe is not under a roadway, parking lot, or other paving structure. However, if the native material is a CH soil in must be replaced with a material suitable to the engineer.

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B. Bedding and Cover for HP and HDPE Pipe

1. Bedding for HP and HDPE Pipe shall be as follows:
 - a. The pipe shall be bedding to a depth of 50% of the diameter of the pipe and shall extend to 6" below the bottom of the pipe.
 - b. The bedding material will consist of 610 crushed stone as described in Section 70 3. 04 of the Mississippi Standard Specifications for Road and Bridge Construction 2017 Edition.
2. The backfill above the bedding and above the conduit shall meet the requirements of the borrow material approved to be used in the roadway section of the project.
 - a. If no approved borrow material is given in the project the backfill and cover material shall meet the requirements of a B9-10 as described in Section 70 3. 21 of the Mississippi Standard Specifications for Road and Bridge Construction.
 - b. Native material will be acceptable in locations where the pipe is not under a roadway, parking lot, or other paving structure. However, if the native material is a CH soil in must be replaced with a material suitable to the engineer.

2.3 PIPE MATERIALS

A. Concrete Pipe and Concrete Pipe End Sections:

1. Material used for the construction of RCP, RCAP, RCP FES, and RCAP FES shall meet the requirements of Section 708 of the Mississippi Standard Specifications for Road and Bridge Construction.

B. HP Storm Pipe

1. Polypropylene compound for pipe and fitting production shall be impact modified copolymer meeting the material requirements of ASTM F2881, Section 5 and AASHTO M330, Section 6.1.

C. HDPE Pipe

1. Material for pipe production shall be an engineered compound of virgin and recycled high-density polyethylene conforming with the minimum requirements of cell classification 424420C (ESCR Test Condition B) for 4- through 10-inch (100 to 250 mm) diameters, and 435420C (ESCR Test Condition B) for 12- through 60-inch (300 to 1500 mm) diameters, as defined and described in the latest version of ASTM D3350.

D. Fill at Pipe Ends

1. Riprap as specified in Section 31 37 16.13 - Rubble-Stone Riprap.

2.4 ACCESSORIES

A. Geotextile Filter Fabric:

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1. Comply with AASHTO M288 for subsurface drainage.
2. Type: V meeting the requirements of a Class V Geotextile Fabric Per Section 71 4. 13.11 of the Mississippi Standard Specifications for Road and Bridge Construction.

B. Gaskets

1. Gaskets for RCP Pipe:
 - a. Gaskets shall meet the requirements of ASTM C443, C1619 Class C or Class A
2. Gaskets for HP Storm Pipe:
 - a. Gaskets shall meet the requirement of ASTM F477. The Gasket will be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly. 12- through 60-inch (300 to 1500 mm) diameters shall have an exterior bell wrap installed by the manufacturer.
3. Gaskets for HDPE Pipe:
 - a. The joint shall be watertight according to the requirements of ASTM D3212. Gaskets shall meet the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly 12- through 60-inch (300 to 1500 mm) diameters shall have an exterior bell wrap installed by the manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that trench cut is ready to receive Work of this Section.
- B. The contractor shall field locate the pipe ends and notify the engineer for concurrence.
- C. Verify that excavations, dimensions, and elevations are as indicated on the drawings.

3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Correct over-excavation with fine aggregate.
- C. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.

3.3 INSTALLATION

- A. Excavation and Bedding:

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1. Excavate culvert trench to 6 inches below pipe bottom.
2. Hand trim excavation for accurate placement of piping to indicated elevations.
3. Place bedding material at trench bottom.
4. Maintain optimum moisture content of bedding material to attain required compaction density.
5. Level fill materials in continuous layers not exceeding 8 inches in depth, and compact to 95 percent maximum density.

B. Culvert:

1. Positioning:
 - a. Lift or roll culvert into position; do not drop or drag culvert over prepared bedding.
 - b. Shore culvert to required position and retain in place until after compaction of adjacent fills.
 - c. Ensure that pipe remains in correct position and to required slope.
 - d. Wrap pipe joints in geotextile fabric.
 - e. Secure filter fabric over lifting holes with duct tape.
 - f. For RCP and RCAP use manufactured supplies plugs to fill lifting holes.
2. Backfilling and Compaction:
 - a. Level fill materials in continuous layers not exceeding 8 inches in depth, and compact to 95 percent maximum density.
 - b. Do not displace or damage pipe while compacting.
 - c. Install cover at sides and over top of pipe.
 - d. Install cover to maximum compacted thickness of 12 inches, and compact to 95 percent maximum density.
 - e. Maintain optimum moisture content of bedding material to attain required compaction density.
 - f. Place geotextile fabric over backfill as indicated on Drawings.

C. Pipe Ends:

1. Place rip rap at pipe ends as indicated on Drawings.
2. Level fill materials in continuous layers not exceeding 6 inches in depth, and compact to 95 percent maximum density.

3.4 TOLERANCES

- A. Maximum Variation from Indicated Slope: 1/8 inch in 10 feet.
- B. Maximum Variation from Intended Elevation of Culvert Invert: 1/2 inch.
- C. Maximum Offset of Pipe from Indicated Alignment: 1 inch.
- D. Maximum Variation in Profile of Structure from Intended Position: 1.0 percent.

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3.5 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.
- B. Inspection: Request inspection from Architect/Engineer prior to and immediately after placing aggregate cover over pipe.
- C. Compaction Testing:
 - 1. Comply with ASTM D1557.
 - 2. If tests indicate that Work does not meet specified requirements, remove Work, replace, and retest.
 - 3. Testing Frequency: The bedding material shall be tested for each run of pipe with an additional test for every 100' of pipe length.

3.6 PROTECTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect pipe and bedding from damage or displacement until backfilling operation is in progress.

END OF SECTION