

Beaufort Design Build, LLC

ADDENDUM # 2

May 14, 2020

**Beaufort County Engineering
Beaufort County DNA Laboratory Addition**

Beaufort, South Carolina

IFB Number 052920E

NOTICE TO ALL BIDDERS

The following shall take precedence over the plans and specifications for the above referenced project and shall become part of the contract documents. Information provided in the plans and specifications and not modified or amended herein shall remain in effect.

Number of items and pages included: 1 items, 1 pages

Attachments: IFB 052920E Project Manual

Reminder: Bids for the Beaufort County Engineering, Beaufort County DNA Laboratory Addition project will be received until 3:00 PM on Friday, May 29, 2020. Bids will be received through the Beaufort County Purchasing Office website; www.beaufortcountysc.gov/purchasing/. In order to submit a bid, contractors must be registered as a vendor through the same website. Bids will be opened publicly, at the day and time indicated, and read aloud, at the Beaufort County Purchasing Office; 106 Industrial Village Road, Building 2, Beaufort, South Carolina 29906.

PROJECT MAUAL

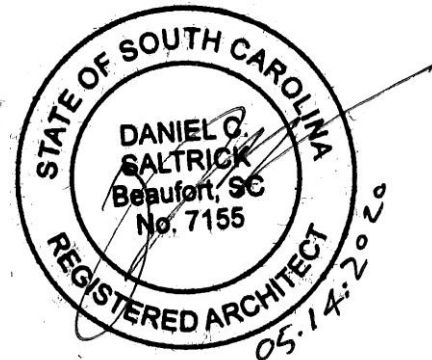
Item 1: The Project Manual Prepared by Beaufort Design Build, LLC. and dated May 14, 2020 is attached.

END OF ADDENDUM # 2

Beaufort Design Build, LLC



Daniel C. Saltrick, AIA



IFB 052920E PROJECT MANUAL

INCLUDING SPECIFICATIONS FOR THE CONSTRUCTION OF
BEAUFORT COUNTY ENGINEERING
Beaufort County DNA Laboratory Addition
BEAUFORT COUNTY
BEAUFORT, SOUTH CAROLINA

Information for Bid
Divisions 00 through 32



Prepared by
BEAUFORT DESIGN BUILD

Date of Issue:
May 14, 2020

Beaufort Design Build Project Number 19044.00



Beaufort Design Build, LLC
2 Fire Station Lane, Seabrook, South Carolina 29940
843-466-3664

This document is setup to print double sided. Blank pages are intentional.

**SECTION 00.2
PROFESSIONAL SEALS**

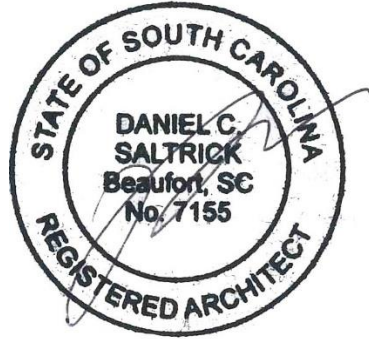
**Architect / Project
Manager**

Divisions 01, 02, 04 and 06 through 32

Beaufort Design Build, LLC

2 Fire Station Lane
Seabrook, South Carolina 29940
843-466-3664

Architect of Record:
Daniel C. Saltrick, AIA



Civil Engineer

Company Name

NOT USED

Address

Address

Phone Number

Engineer of Record:
Name, PE

Structural Engineer

Company Name

NOT USED

Address

Address

Phone Number

Engineer of Record:
Name, PE

Fire Protection Engineer

Company Name

NOT USED

Address

Address

Phone Number

Engineer of Record:
Name, PE

Plumbing Engineer

Division 22

Optima Engineering

1927 South Tryon Street, Suite 300
Charlotte, NC 28203
704-338-1292

Engineer of Record:
George C. Fowler, III, PE



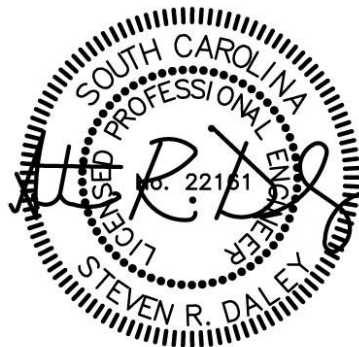
Heating, Ventilation and Air Conditioning Engineer

Division 23

Optima Engineering

1927 South Tryon Street, Suite 300
Charlotte, NC 28203
704-338-1292

Engineer of Record:
Steven R. Daley, PE



Electrical Engineer

Divisions 26

Optima Engineering

1927 South Tryon Street, Suite 300
Charlotte, NC 28203
704-338-1292

Engineer of Record:
Zane Kuseybi, PE

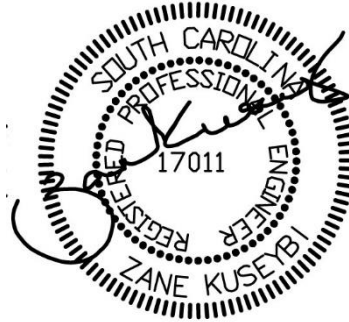


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BEAUFORT COUNTY DNA LABORATORY ADDITION

IFB #052920E



Prepared by: Beaufort County Engineering Department

Dated: April 29, 2020

Bid Due Date: May 29, 2020 at 3:00 pm

IMPORTANT ELECTRONIC SUBMITTAL INSTRUCTIONS

In order to do business with the Beaufort County, vendors must register with Purchasing through our Vendor Registration system, powered by Vendor Registry. The County may reject any quotes, bids, proposals and qualifications submitted by businesses that are not registered. Registering also allows businesses to identify the type of goods and services they provide so that they may receive email notifications regarding relevant solicitations out for bid.

To register with the County go to www.beaufortcountysc.gov and go to the Purchasing Department's page and click on Vendor Registration. Once registered you may submit your proposal through the solicitation section in Vendor Registry.

IMPORTANT ELECTRONIC SUBMITTAL REQUIREMENTS

Response submittals for this Invitation for Bid will ONLY be received electronically and must be submitted ONLINE prior to the date and time listed on the cover page of this IFB document.

All responses must adhere to the following guidelines:

- Suppliers are encouraged to submit responses as soon as possible. Responses are received into a 'lockbox' folder and cannot be opened prior to the due date and time. The time and date of receipt as recorded by the server will serve as the official time of receipt. The County is not responsible for late submissions, regardless of the reason;
- All requested information and forms MUST be uploaded as one file if possible. Each submission must be inclusive of all required forms. If it is necessary to have more than one upload, pricing and signed acknowledgements, etc. are to be in the first upload and the MSDS should be in the second, with each titled accordingly. If you have a problem with your upload, you may contact Vendor Registry at **844-802-9202** or cservice@vendorregistry.com.

COUNTY COUNCIL OF BEAUFORT COUNTY

Title VI Statement to Prime Contractors, Subcontractors, Architects, Engineers, and Consultants



It is the policy of the County Council of Beaufort County, South Carolina, hereafter referred to as "Beaufort County" or "the County", to comply with Title VI of the 1964 Civil Rights Act (Title VI) and its related statutes. To this end, Beaufort County assures that no person shall be excluded from participation in, denied the benefit of, or subjected to discrimination under any of its programs or activities on the basis of race, color, national origin, age, sex, disability, religion, or language regardless of whether those programs and activities are Federally funded or not. The County is also committed to assuring every effort will be made to prevent the discrimination of low-income and minority populations as a result of any impact of its programs or activities. Beaufort County also assures that every effort will be made to prevent discrimination through the impacts of its programs, policies, and activities on minority and low-income populations. Additionally, the County will take reasonable steps to provide meaningful access to services for persons with limited English proficiency. In addition, Beaufort County will not retaliate against any person who complains of discrimination or who participates in an investigation of discrimination. Beaufort County will, where necessary and appropriate, revise, update, and incorporate nondiscrimination requirements into appropriate documents, directives, and regulations.

Pursuant to Title VI requirements, any entity that enters into a contract with Beaufort County including, but not limited to Prime Contractors, Subcontractors, Architects, Engineers, and Consultants, may not discriminate on the basis of race, color, national origin, age, sex, disability, religion, or language in their selection and retention of first-tier subcontractors, and first-tier subcontractors may not discriminate in their election and retention of second-tier subcontractors, including those who supply materials and/or lease equipment. Further, Contractors may not discriminate in their employment practices in connection with highway construction projects or other projects assisted by the U.S. Department of Transportation (USDOT) and/or the Federal Highway Administration (FHWA).

In all solicitations either by competitive bidding or negotiation made by the Contractor for work to Beaufort County to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the Contractor of the Contractor's obligations under the contract and the Title VI regulations relative to nondiscrimination on the basis of race, color, national origin, age, sex, disability, religion, or language by providing such a statement in its bidding and contract documents.

Upon request, the Contractor shall provide all information and reports required by Title VI requirements issued pursuant thereto, and shall permit access to its books, records, accounts and other sources of information, and its facilities as may be determined by Beaufort County, USDOT, and/or FHWA to be pertinent to ascertain compliance with such regulations, orders, and instructions. Where any information required of a Contractor is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to USDOT or FHWA, as appropriate and via Beaufort County, and shall set forth what efforts it has made to obtain the information. In the event of the Contractor's non-compliance with nondiscrimination provisions of this contract, USDOT may impose such contract sanctions as it or FHWA may determine to be appropriate, including, but not limited to:

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

In the event a Contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of this direction to comply with Title VI, the Contractor may request USDOT to enter such litigation to protect the interests of USDOT and FHWA. Additionally, the Contractor may request the United States to enter such litigation to protect the interests of the United States. Any person or Subcontractor who believes that they have been subjected to an unlawful discriminatory practice under Title VI has a right to file a formal complaint within one hundred eighty (180) days following the alleged discriminatory action. Any such complaint must be filed in writing or in person:

Beaufort County Government
Post Office Drawer 1228 · Beaufort, SC 29901-1228
843-255-2354 Telephone · E-mail: compliance@bcgov.net

THIS IS NOT AN ORDER

*VENDOR ORIGINAL
 *VENDOR COPY

Dates Advertised: April 29, 2020

	(IFB)	FORMAL SEALED BID (X) REQUEST FOR QUOTE () We require bids to be electronically submitted through our Vendor Registry Program. Please go to www.BeaufortCountySC.gov and sign up to submit your bid. If you do not have access to a computer, you may hand deliver your bid.	
	BIDS WILL BE RECEIVED UNTIL 3:00 P.M. LOCAL TIME ON: May 29, 2020	Bid No. <p style="text-align: center;">IFB 052920E</p>	
BID TITLE: Beaufort County DNA Laboratory Addition			
PREBID CONFERENCE: Pre-Bid conference will be held on May 12, 2020, at 2:00 p.m., in the Finance Conference Room located at 106 Industrial Village Road, Building 2, Beaufort, SC 29906. Bidders are responsible for their own transportation. All interested bidders must attend the meeting.			
David L. Thomas, CPPO Purchasing Director	Mailing Date	E-MAIL QUESTIONS TO: Dave Thomas – dthomas@bcgov.net at least calendar 10 days before bid opening.	
VENDOR NAME		REASON FOR NO BID	
VENDOR MAILING ADDRESS		Amend Number(s) Received:	
CITY-STATE-ZIP-CODE		S.C. TAX NO.	
Telephone Number ()		FEDERAL I.D. OR SOCIAL SECURITY NO.	
Toll-Free Number ()			
Fax Number ()			
I certify that this bid is made without prior understanding, agreement, or connection with any corporation, firm or any corporation, firm, or person submitting a bid for the same materials, supplies, or equipment, and is in all respects fair and without collusion or fraud. I agree to abide by all conditions of this bid and certify that I am authorized to sign this bid for the bidder.		AUTHORIZED SIGNATURE (MANUAL)	
		AUTHORIZED SIGNATURE (TYPE/TITLE)	
Bid Security is attached (if required) in the amount of: 5% of Bid if over \$30,000.00.			

BID ACCEPTANCE AND DELIVERY (Prices bid must be firm for a minimum of 90 days). In compliance with the Invitation, and subject to all conditions thereof, the above signed offers and agrees, if this bid is accepted within ___ days from date of opening, to furnish any or all items quoted on at prices as set forth after the item and to make delivery within ___ days after receipt of order with transportation cost included and prepaid. Unless otherwise stated and accepted herein, I agree to complete this proposed contract in less than sixty (60) days after issue date of purchase order.

IMPORTANT

IF YOU CONSIDER THESE SPECIFICATIONS AS RESTRICTIVE,
 SEE GENERAL PROVISIONS, PARAGRAPH #20, DISCREPANCIES.

* Bids received after the time specified for opening cannot be considered.

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PROJECT SUMMARY

IFB #052920E – Beaufort County DNA Laboratory Addition

INTRODUCTION

The Work includes construction of a 1970 square foot, single-story office building addition for the existing Beaufort County DNA Laboratory. When complete, the building will house the offices for the DNA Laboratory. The Work includes spread footings, masonry stem wall (perimeter), masonry piers, engineered wood floor joist and pre-engineered roof trusses. The building envelope includes wood framed walls with cementitious board and batten, siding, and trim with aluminum double hung windows. Interior walls are gypsum board on wood studs with solid core wood doors in hollow metal frames. Interior finishes include resilient tile, carpet and paint. The building and building addition is not fire sprinklered. Mechanical work includes one (1) split system heat pump. Plumbing includes water and waste piping and fixtures for restroom and breakroom. Electrical work includes a new 120/208, 200-amp panel which is to be connected to the existing main panel.

The selected firm must provide all services in full compliance with all applicable local, State, and Federal laws and regulations.

The winning bidder will provide submittals and shop drawings for review for all materials and equipment prior to incorporation into the project. During the course of the contract, the Contractor will be required to perform SWPPP inspections of the site and surroundings. Before final acceptance, the Contractor will provide an as-built survey to Beaufort County Engineering.

For each of the two alternates identified in the Plans (pages A-101 and A-101.1, provide a lump sum price proposal for the work to include but not limited to the following:

1. A base bid for all work as shown, indicated and implied by the construction plans as prepared by Beaufort Design Build, LLC. (See Exhibit 2 – Construction Plans) and by the contract.
2. Your submission should have a Total Bid for Alternate 1 (1970 sq ft addition) and a separate Total Bid for Alternate 2 (1544 sq ft addition).

Work by others:

1. Geotechnical Engineering Report to be completed by Whitaker Labs. Expected completion: May 1, 2020.
2. Fees to be paid by Beaufort County:
 - a. Building Permit Fee
 - b. Stormwater MS4 Permit Fee
 - c. City of Beaufort Development Permit Fee
3. Beaufort Design Build will obtain building permit.

Project Administration:

Beaufort County Engineering Department
2266 Boundary Street
P.O. Drawer 1228
Beaufort, SC 29901-1228

Contract Type:

Lump sum.

Contract Time:

Contractor shall complete all work within 180 days from Notice to Proceed.

BID INVITATION
BEAUFORT COUNTY DNA LABORATORY ADDITION
IFB #052920E

Sealed bids submitted via Vendor Registry will be received electronically until 3:00 p.m. (EST) May 29, 2020 at which time responses to this request will be recorded in the presence of one or more witnesses in the Purchasing Department, 106 Industrial Village Road, Bldg. #2, Beaufort, South Carolina.

BEAUFORT COUNTY DNA LABORATORY ADDITION

A **PreBid meeting will be held 12 May, 2020 at 2:00pm** in the Beaufort County Purchasing Department, 106 Industrial Village Road, Bldg. #2, Beaufort, South Carolina.

Bid documents are available on the Beaufort County Web Site at www.beaufortcountysc.gov. To obtain these documents you must be a registered vendor with Beaufort County. The contact phone number for the Engineering Department is 843- 255-2700.

Beaufort County reserves the right to reject all proposals and to waive minor informalities and irregularities.

All Bids shall be accompanied by a Bid Bond drawn in favor of the Beaufort County Treasurer of Beaufort County, Beaufort, South Carolina, in the amount of at least five percent (**5%**) of the bid for the complete work: such Bid Bond representing that the Bidder, if awarded a contract, will promptly enter into a contract and furnish Performance Bond and Payment Bond as provided by law and approved by the attorney for Beaufort County, South Carolina. Each bond shall be equal one hundred percent (**100%**) of the contract amount. The Bid Bond shall be forfeited to the **County Council of Beaufort County, South Carolina** as liquidated damages if the Bidder fails to execute the contract and provide Performance and Payment Bonds within fourteen (**14**) days after being notified that he has been awarded the Contract.

Bidders must comply with Title VI of the Civil Rights Act of 1964, the Anti-Kickback Act, the Contract Work Hour Standard Act, and the National Occupational Safety and Health Act of 1970.

Bidders must certify that they do not and will not maintain or provide for their employees any facilities which are segregated on the basis of race, color, creed, or national origin.

The Beaufort County Council reserves the right to reject all Bids and waive any formalities. Any claims for cost incurred by any bidders in preparation of any part of, or total package for, this project will not be handled for reimbursement by Beaufort County or their representatives.

The Bidder is **required** to submit only the Bid documents, which include all contained in Exhibit 1, Required Documents.

1. Invitation for Bid
2. Bid Form
3. Schedule of Prices
4. Bid Bond
5. Consent of Surety
6. Certification by Contractor Regarding Non-Segregated Facilities
7. Non-Collusion Affidavit
8. Contractors Qualification Statement
9. Local Vendor Preference
10. Small and Minority Business Participation
11. Self-Performance Affidavit
12. Good Faith Efforts Checklist
13. Non-Discrimination Statement

Public bid opening will be held at the **Purchasing Department**, 106 Industrial Village Road, Bldg. 2, Beaufort SC 29906 at 3:00 P.M. (EST), May 29, 2020.

INSTRUCTIONS TO BIDDERS

1. DEFINED TERMS

Terms used in these Instructions to Bidders, which are defined in the General Conditions and Supplementary Conditions have the meanings assigned to them therein.

2. CONTRACT DOCUMENTS

2.1 Bidder should verify that the Contract Documents are complete in the number of documents as indicated by the List of Documents, and in the number of pages in each document.

2.2 Bidder must use a complete set of Contract Documents in preparing Bid; neither Owner nor Engineer assume any responsibility for errors or misinterpretations resulting from the use of an incomplete set of Contract Documents.

2.3 Bidder has the responsibility prior to submitting Bid to examine the Contract Documents thoroughly and notify the Engineer of all conflicts, errors or discrepancies, or of questions or meaning or intent. Bidder is encouraged to visit the construction site prior to submitting a Bid.

2.4 Addenda may be issued to modify the Contract Documents in response to notifications made by Bidders, or for other reasons. Addenda will be posted on Vendor Registry at least five days prior to Bid opening. If addenda are required to post less than five calendar days prior to Bid Opening, then it shall be the responsibility of the Bidder who considers that the issued addenda does not provide sufficient time to address the Bid, notify the owner, by phone and in writing of the need to delay the Bid Opening. The owner shall then notify all prospective bidders via email and on Vendor Registry of the revised Bid Opening Date.

2.5 Bidders shall check Vendor Registry to verify the number, if any, of Addenda issued.

3. ORGANIZATION OF CONTRACT DOCUMENTS

3.1 The Bid form contains understandings and representations made by Bidder in submitting the Bid; in addition, the Schedule of Items is included.

3.2 The form of Notice of Award and Agreement, which may be executed by the Owner with the Successful Bidder, is incorporated in the Contract Documents.

3.3 The General Conditions incorporated in the Contract Documents are the **STANDARD GENERAL CONDITIONS OF THE BEAUFORT COUNTY, SOUTH CAROLINA CONSTRUCTION CONTRACT**

3.4 The actual amendments or supplements to the Standard General Conditions are made in the Supplementary Conditions by reference to the specific article or paragraph so amended or supplemented. The Supplementary Conditions may also contain additional paragraphs incorporating language required by South Carolina contract law.

3.5 The General Requirements of the Specifications contain additional amendments and supplements to the Standard General Conditions of the Construction Contract with regard to general and administrative matters, and contain details for the Work of this Contract.

3.6 The Technical Requirements of the Specifications may cover a breakdown of the Goods and/or Service by Sections; solely for reference and payment, and not for dividing Goods and/or service among subcontractors or suppliers. Each section includes general information on the Work included, and method of payment. Items in the Technical Sections for which payment is to be made are listed in the Schedule of Items in the Bid Form.

3.7 The drawings are complementary to the Specifications to show size, form, location and arrangement of various elements of the Work.

3.8 Section 6.0 - Special Provisions may contain additional instruction, conditions or directions directly related to the contract or Work of the Contractor.

3.9 The General Conditions indicates that information and data reflected in the Contract Documents

with respect to Underground Facilities at or contiguous to the site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities or others, and Owner and Engineer shall not assume responsibility for the accuracy or completeness thereof.

3.10 Bidder, prior to submitting a Bid, may conduct at bidder's expense any additional examinations, investigations, explorations and tests pertaining to subsurface and physical conditions, and to Underground Facilities, which are deemed necessary by Bidder to determine an appropriate Bid for performing and furnishing the work in accordance with the Contract Document. Owner will provide Bidder with access to the site for the purpose set forth in this paragraph upon agreement of the Bidder to restore the site as nearly as possible to its original condition.

4.0 SCHEDULE OF PRICES

Bidder, with regard to completing the Schedule of prices of the Bid Form, is advised as follows:

4.1 The Owner, a public body, is not exempt from South Carolina State Sales and Use Taxes and equipment to be incorporated in the Work, and such taxes shall be included in with price Bid.

4.2 The quantities indicated for Unit Price Work, if any, are estimates and not guaranteed and final payment will be based on actual quantities constructed.

4.3 The Agreement, if made, will be on the basis of materials and equipment indicated in the Drawings or specified in the Specifications without consideration of possible substitute items.

4.4 The lands upon which the Work are to be performed, rights-of-way and easements for access thereto and other lands designated for use by Contractor in performing the Work are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities or storage of materials and equipment are to be provided by Contractor.

4.5 The amount Bid for each item must be written in words where indicated; these written entries shall control with regard to price of the Bids received.

5.0 SUBMISSION OF BIDS

5.1 Bidder must provide all information requested in the Bid Form and in attachments thereto by appropriate entries handwritten in ink or typewritten.

5.2 Bidder must sign the Bid Form as follows:

5.2.1 Proprietorship, signature shall be that of the Proprietor.

5.2.2 Partnership, signatures shall be that of the person or persons authorized to sign and attest for the partnership.

5.2.3 Corporation, signatures shall be that of the person or persons authorized to sign and attest for the corporation.

5.3 If Bidder is, a joint venture set forth the full name of the identity or identities comprising the joint venture. Each joint venture must sign in the manner indicated for the respective form of ownership as set forth in Paragraph 6.2 of these Instructions to Bidders.

5.4 Bidder must submit with the Bid Form a Bid Security made payable to the Beaufort County Treasurer in an amount of not less than five percent (**5%**) of the total amount indicated in the Bid Form, in the form of a certified or bank check or a Bid Bond issued by a surety authorized to do business in South Carolina.

5.5 Bids including Bid Security and other required documents, shall be submitted as indicated in the advertisement for Bids

5.6 Bids may be modified or withdrawn by a document duly executed in the manner that a Bid must be executed and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

6.0 DISPOSITION OF BIDS

6.1 **OWNER** any time prior to Bid opening may withdraw the advertisement for Bids and not accept

Bids. Any Bid received under this circumstance will be returned, unopened to Bidder.

6.2 **OWNER** may open Bids and (unless obviously non-responsive) read aloud publicly.

6.3 **OWNER** will reject Bids other than the three (3) apparent lowest responsible bids and return Bid Security for rejected Bids within ten (10) business days after the date of Bid opening.

6.4 **OWNER** may hold the three (3) apparent lowest responsible Bids subject to acceptance for ninety (90) days after the day of the Bid opening; and the Bid security of these Bidders will be returned as follows: (1) to the unsuccessful Bidders within three (3) business days after a Notice of Award is made to Successful Bidder, and (2) to the Successful Bidder after the Agreement is executed and the required contract security furnished.

6.5 **OWNER**, in evaluating Bids, will consider the qualifications of the Bidders, whether or not the Bids comply with the prescribed requirements, and such alternates, and of the data, as may be requested by the Bid Form.

6.6 **OWNER** reserves the right to reject any and all Bids, to waive any informality and to reject nonconforming, non-responsive, unbalanced or conditional Bids.

6.7 **OWNER** may conduct reasonable investigations as deemed necessary to assist in the evaluation of Bids and to establish the responsibility, qualifications and financial ability of Bidders to perform and furnish the Work in accordance with the Contract Documents.

6.8 The Beaufort County Council reserves the right to reject all Bids and waive any formalities. Any claims for cost incurred by any bidders in preparation of any part of, or total package for this project will not be handled for reimbursement by Beaufort County or their representatives.

7.0 AWARD OF CONTRACT

7.1 **OWNER**, if the Contract is awarded, will award it to the lowest responsible Bidder. The lowest Bid will be determined based on the total of the Bid price for each item as indicated in words in the Bid Form. The written entries will control over numerical entries regardless of whether there are arithmetic discrepancies between the written amount and the numerical entries.

7.2 **OWNER** will give the Successful Bidder a Notice of Award within ninety (90) days after the day of the Bid opening, if the Contract is to be awarded.

7.3 **OWNER'S** Notice of Award to the Successful Bidder will be transmitted with the required number of unsigned counterparts of the Agreement.

7.4 Successful Bidder, within fourteen (14) days after receiving Notice of Award shall sign and deliver the required number of counterparts of the Agreement to Owner with the required Bond. Paragraph 5.1 of the General Conditions and the Supplementary Conditions set forth Owner's requirements as to performance and payment bonds.

7.5 Bidder, in submitting Bid, understands and agrees that the Bid security may be forfeited as liquidated damages, and not as a penalty, if the Bidder is determined to be Successful Bidder and thereafter fails to execute the Agreement and furnish the required Bonds within the stipulated time.

7.6 **OWNER**, within ten (10) days after receiving the Agreement and bonds, shall deliver one signed counterpart to Contractor, and thereby establish the effective Date of the Agreement.

7.7 The successful Bidder shall secure and pay for necessary approvals, permits, assessments, and changes required for the construction and installation of this project as required by local, state, and federal regulations. County permits shall be required as applicable, but the fee shall be waived. This waiver shall apply to the Beaufort County permit fee only and not to any "City or Town" permit fee and/or licenses, when applicable.

8.0 COMMENCEMENT OF CONTRACT TIME

8.1 **OWNER** may give **CONTRACTOR** a Notice to Proceed within thirty (30) days after the Effective Date of the Agreement, and indicate there in the day on which the Contract Time will commence to run.

9.0 CONTRACT TIME

Reference Project Summary

10.0 DAMAGES

Reference section twenty of contract for Liquidated Damages.

11.0 RETAINAGE

Per Standard General Conditions

12.0 RIGHT TO PROTEST

12.1 Any actual bidder who is aggrieved in connection with the award of a contract may protest to the Purchasing Director. The protest shall be submitted in writing within fourteen (14) days of the Bid opening. The protest must be accompanied by a detailed statement indicating the reasons for such protest.

12.2 Authority to Resolve Protest. The Purchasing Director shall have authority, prior to the commencement of an action in court concerning the controversy, to settle and resolve a protest of an actual aggrieved bidder, concerning the award of the contract.

12.3 Decision. If the protest is not resolved by mutual agreement, the Purchasing Director shall issue a decision in writing within ten (10) days of receipt of the written protest. The decision shall:

- a) State the reasons and describe the actions taken; and
- b) Inform the protestant of its right to administrative review as provided in this Section.

12.4 Notice of Decision. A decision under Subsection (3) of the Instructions to Bidder shall be noticed by certified mail to the protestant and any other party intervening.

12.5 Rights to Review

- a) Any person adversely affected by the decision appeals administratively within (10) Days after receipt of decision to the County Council in accordance with this section.
- b) Any protest taken to County Council or court shall be subject to the protestant paying all of Beaufort County administrative costs, attorney fees and court costs, when it is determined that the protest is without standing.

12.6 Litigation

- a) Any litigation arising out of this Bid Award or subsequent contract or agreement shall be held only in a Circuit Court of Beaufort County, Beaufort, South Carolina and the fourteenth Judicial Circuit.

STATE OF SOUTH CAROLINA)
)
COUNTY OF BEAUFORT)

CONTRACT
No. IFB 052920E
Beaufort County DNA Laboratory Addition

THIS CONTRACT (hereinafter the "Contract") entered into this XX day of XXXXX, 2020 between the **COUNTY OF BEAUFORT**, South Carolina, a public body corporate and politic and political subdivision of the State of South Carolina, (hereinafter the "County") and **Contractor Name Here** (hereinafter the "Contractor"), ("Party" as to each; collectively the "Parties").

WITNESSETH:

WHEREAS, the County has sought to contract with an independent contractor for the furnishing of all labor, supervision, materials and equipment required to perform and complete enhancement work to the XXXXXXXX (the "Work") as detailed in the Contract Documents (defined below); and

WHEREAS, the County solicited proposals pursuant to **IFB No. 052920E** for the aforesaid Work that is needed; and

WHEREAS, the Contractor has represented to the County that its staff is qualified to provide the Work required in this Contract in a professional and timely manner; and

WHEREAS, the County has relied upon the above representations by the Contractor; and

WHEREAS, the Contractor desires to provide the aforesaid services pursuant to the terms and conditions contained below;

NOW, THEREFORE, in consideration of these premises and of the mutual covenants herein set forth, it is agreed by and between the Parties hereto as follows:

SECTION ONE
Definitions

Unless the context clearly requires otherwise, all capitalized terms used in this Contract shall have the meanings set forth in this Section One.

"Commencement Date" means the date specified in the Notice to Proceed as the date on which the Contractor shall begin providing the Work.

"Contract Documents" means all exhibits, attachments, specifications, and any addenda to this Contract that are incorporated by reference into this Contract and which are marked as follows:

EXHIBIT 1: Required Documents

EXHIBIT 2: Construction Plans

In the event of any conflict, discrepancy, or inconsistency among any of the documents which make up this Contract, the following shall control:

- a. As between the Contract and the Contract Documents and any other document to include, but not limited to, the plans or specifications, the Contract shall govern.

- b. In the event of any conflict, discrepancy, or inconsistency among any of the other Contract Documents, the Contractor shall notify the County immediately upon discovery of same, and the County will notify the Contractor of the resolution.
- c. Any documents not included or expressly contemplated in this Contract do not, and shall not, form a part of this Contract. The Contract Documents are intended to be complementary, and a requirement in one document shall be deemed a requirement in all documents.

Certain publications shall also govern the Work hereunder, unless otherwise provided herein, and are also hereby incorporated by reference.

“Contract Price” means the price listed in the Contract for the Work to be received in return.

“Contractor” has the meaning assigned above to that term, and includes that company’s agents, employees, and representatives.

“Contract Quantities” means the estimated quantities listed on the bid form.

"County" means County of Beaufort, a public body politic and corporate and political subdivision of the State of South Carolina.

“Engineer” means the Project Engineer for the County, acting directly or through its duly designated representative, such representative acting within the scope of particular duties assigned to it or of the authority given it. For purposes of this Contract and the Work to be performed under it, the duly designated representative of the Engineer shall be the Project Manager (as defined below).

“Final Payment” means the last payment from the County to the successful Bidder of the entire unpaid balance of the Contract sum as adjusted by any approved change orders.

“Notice to Proceed” means the written notice to be given by the County to the Contractor to commence Work under this Contract.

“Purchasing Director” means the Purchasing Director for Beaufort County.

“Project” means the “Work” and is used interchangeably with that term.

“Project Manager” shall be the field representative designated by the County to serve as project manager for the Work.

“Project Site” means the site or sites where the Work is performed. This term is used interchangeably with “Work Site.”

“Work” means the work specified and described in the exhibits under “Contract Documents” and includes, but is not limited to, materials, workmanship, manufacture and fabrication of components.

“Work Site” means the “Project Site” and is used interchangeably with that term.

SECTION TWO

Term

The Contractor shall complete the work described within 180 calendar days after issuance of a Notice to Proceed. The Contractor shall not commence Work prior to the issuance of a Notice to Proceed.

SECTION THREE

Work

Contractor agrees to perform and furnish all labor, supervision, materials, equipment, tools, machinery, transportation and supplies necessary for the completion of the Work required under this Contract in a professional and timely manner.

Work is to be completed as indicated in Section Two after the issuance of the Notice to Proceed, absent any extensions as provided in Section Five hereof.

SECTION FOUR

Contract Price: Payment Terms

A. The Contractor is to perform the Work beginning on the Commencement Date until the termination of this Contract for the total, all-inclusive price not to exceed or lump sum (Choose One) Spell out dollar value (\$X,XXX,XXX.XX).

The amount as specified may be increased or decreased by the County through the issuance of a change order or amendment. Any prices specified in Contractor's Bid or any such change order or Amendment will remain firm for the term of this Contract and any Amendment thereto.

B. The Contractor shall submit monthly invoices itemizing all labor and materials for which payment is requested. Subject to approval of the invoice by the County, the County shall pay Contractor for the performance of the Work, including all labor and items necessary to accomplish and complete the Work, in accordance with all terms and conditions as stated in the Contract Documents, on the following basis:

The Contractor shall submit invoices in the format that will be provided by the County at the preconstruction meeting. Failure to follow the format may result in payment delays.

All invoices will be processed by the County once a month. All partial payments will be based upon the Contractor's invoices, approved by the Project Manager, for the Work performed and materials completely in place in accordance with the Contract and to the satisfaction of the Project Manager. Ten (10%) percent or Fifty-Thousand (\$50,000), Dollars whichever is less, shall be retained by the County and the remainder shall be paid to the Contractor. Retainage shall not be released until after the completion of all the Work to the satisfaction of the County.

C. Invoices will be submitted to the Project Manager J. Wes Campbell, Beaufort County Engineering Department, 2266 Boundary Street, Beaufort, S.C. 29906. Invoices will contain a reference to IFB No. 052920E, and shall include: the Period of time covered by the invoice; a Summary of work performed for the billing period; Purchase order and Contract Number; and Contractor's Tax Identification Number.

- D. If Applicable, with regard to items (which term includes, without limitation, any and all materials) in the Contract Price, the County reserves the right to increase the Contract Quantities by an amount not to exceed in value twenty (20%) percent of the total Contract Price or decrease the Contract Quantities by an amount not to exceed in value twenty (20%) percent of the total Contract Price. Payment will be made based on the unit prices submitted by the Contractor and incorporated by reference in this Contract.

No claim shall be made by the Contractor for any loss of anticipated profits or unabsorbed overhead because of any such alteration, or by reason of any variation between the approximate quantities and the quantities of work as done. If the altered or added work is of sufficient magnitude as to require additional time in which to complete the Project, such time adjustment will be made at the determination of the County.

- E. No claim by the Contractor for any adjustment under this Contract shall be allowed if asserted after Final Payment under this Contract.
- F. When the County requires substantiating information, the Contractor shall submit data justifying dollar amounts in question.

SECTION FIVE

Time

The Contractor agrees to punctually and diligently perform all parts of the Work at the time scheduled by the Contractor which shall be subject to change by the County as deemed necessary or convenient to the overall progress of the Project. In this connection, the Contractor agrees that the Contractor will keep itself continually informed of the progress of the job and will, upon its own initiative, confer with the County so as to plan its work in coordinated sequence with the Work of the County and of others and so as to be able to expeditiously undertake and perform the Work at the time most beneficial to the entire Project. The Contractor will be liable for any loss, costs, or damages sustained by the County for delays in performing the Work hereunder, other than excusable delays for which the Contractor may be granted an extension of time. If, in the reasonable opinion of the County, the Contractor is not complying with the progress schedule or will not meet the completion date, the County may require the Contractor to provide additional manpower, or work overtime, or expedite materials, and the Contractor shall take the necessary steps to comply, all without increase in Contract Price.

If the Contractor is delayed at any time in the progress of the Work by any act or neglect of the County, or by any separate contractor employed by the County, or by changes in the Work, or by labor disputes, fire, unusual delay in transportation, unusually severe weather conditions, unavoidable casualties, delays specifically authorized by the County, or by causes beyond the Contractor's control, avoidance, or mitigation, and without the fault or negligence of the Contractor and/or subcontractor or supplier at any tier, then the Contract time shall be extended by change order for such reasonable time, if any, as the County may determine that such event has delayed the progress of the Work or overall completion of the Work, if the Contractor complies with the notice and documentation requirements set forth below.

Any claim for extension of time, except as provided for below with regard to rain delays, shall be made in writing to the County, not more than five (5) calendar days from the beginning of the delay. The notice shall indicate the cause of the delay upon the progress of Work. If the cause of the delay is continuing, the Contractor must give written notice to the County every week that the delay continues. Within five (5) calendar days after the elimination of any such delay, the Contractor shall submit further documentation of

the delay and a formal change order request for an extension of time for such delay.

The written request for a time extension shall state the cause of the delay, the number of days extension requested, and such analysis and other documentation to demonstrate a delay in the progress of the Work or the overall Project completion. If the Contractor does not comply with the above notice and documentation requirements, the claim for the delay shall be waived by the Contractor.

Extensions of time shall be the Contractor's sole remedy for any and all delays, hindrances, or obstructions. No payment or compensation of any kind shall be made to the Contractor for damages because of hindrance or obstruction in the orderly progress of the Work or delay from any cause in the progress of the Work, whether such hindrances or delays be avoidable or unavoidable. The Contractor expressly agrees not to make, and hereby waives any claim for damages on account of any delay, obstruction, or hindrance for any cause whatsoever, including but not limited to the aforesaid cause and agrees that the Contractor's sole right and remedy in the case of any delay, obstruction, or hindrance, shall be an extension of the time fixed for completion of the Contract. Without limitation, the County's exercise of its rights under the changes clause, regardless of the extent or number of such changes, shall not under any circumstances be construed as compensable, other than through an extension of time, it being acknowledged that the Contract amount includes and anticipates any and all delays, hindrances, or obstructions whatsoever from any cause, whether such be avoidable or unavoidable.

Weather delays are generally referred to as "rain days," and shall apply to days when the Work cannot be undertaken due to adverse weather conditions. Time for hot, cold, and/or windy conditions have been allowed for in the allocated date of completion. An average number of rain days are included in the completion date determination. This was determined by the following method:

Using the National Oceanic and Atmospheric Administration (NOAA) monthly reports, all days in each month in which rainfall in any part of the day exceeded .10 inch has been calculated and averaged. These averages are as follows:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10	7	6	6	9	14	14	17	11	8	6	10

Rain delays, therefore, will only be considered when the number of days in any month in which rainfall, as recorded by the weather bureau as .10 inch or greater, exceeds the number of days shown. Notwithstanding the days shown on the monthly report, time extensions for rain days will only be considered based upon actual conditions at the Project Site. If, in the opinion of the Contractor, adverse weather causes unsuitable conditions that prevent the Contractor from proceeding with the Work at any time during the term of this Contract, the Contractor shall submit written notification to the County's Representative within twenty-four (24) hours of the onset of said conditions. Notwithstanding the requirements of Section 18, the Contractor shall make a claim for time extension due to rain delays within five (5) calendar days of issuance of the NOAA monthly report.

SECTION SIX
Insurance Requirements

The Contractor, at its own expense, shall at all times during the term of the Contract, maintain insurance as required below. The County may contact the Contractor's insurer(s) or insurer(s)' agent(s) directly at any time regarding the Contractor's coverages, coverage amounts, or other such relevant and reasonable issues related to this Contract. The Contractor shall also require any subcontractors to carry the same coverages in the same amounts.

The County must be advised immediately of any changes in required coverages.

Contractor does hereby covenant, agree and hereby represent to the County that it has obtained worker's compensation insurance, general liability and automobile liability insurance, as well as providing coverage against potential liability arising from and in any manner relating to the Contractor's use or occupation of the premises during the course of performing the contracted services, all in accordance with and as described in the County's IFB 052920E.

1. **INSURANCE REQUIREMENTS**: Prior to commencing work/delivery hereunder, contractor/vendor, at his expense, shall furnish insurance certification showing the certificate holder as Beaufort County, P. O. Drawer 1228, Beaufort, SC 29901, Attention: Risk Management Director, and with a special notation naming Beaufort County as an additional insured on the liability coverages. Minimum coverage shall be as follows:

1.1 Worker's Compensation Insurance – Contractor shall have and maintain, during the life of this contract, Worker's Compensation Insurance for his or her employees connected to the work/delivery, in accordance with the Statutes of the State of South Carolina and any applicable laws. Employers Liability minimum limits required \$500,000

1.2 Commercial General Liability Insurance - Contractor shall have and maintain, during the life of this contract, Commercial General Liability Insurance. Said Commercial General Liability Policy shall contain Contractual Liability and Products/Completed Operations Liability subject to the following minimum limits: \$1,000,000 Each Occurrence/ \$2,000,000 General Aggregate and \$2,000,000 Products/Completed Operations Aggregate naming Beaufort County as an additional insured.

1.3 Comprehensive Automobile Liability Insurance – The Contractor shall have and maintain, during the life of this contract, Comprehensive Automobile Liability, including non-owned and hired vehicles, of at least \$1,000,000 COMBINED SINGLE LIMIT.

1.3.1 ADDITIONAL INSURANCE REQUIREMENTS: Umbrella Liability Insurance – Contractor shall have and maintain, during the life of this contract, Umbrella Liability Insurance with a minimum limit of \$2,000,000

1.3.2: Professional Liability (Errors & Omissions): Professional Liability Insurance protects against losses that occur when a “professional” errors in judgement, planning, and design could result in economic loss to the entity or county. In order to determine if Professional Liability should be required ask yourself: Is the professional licensed or certified (i.e. architects, consultants, auditors, attorneys, engineers, etc.)? Required if a contractor is performing any type of design/build for a particular project.

The vendor shall maintain a limit no less than \$1,000,000 per occurrence:

1.4 The required insurance policy at the time of issue must be written by a company licensed to

- do business in the State of South Carolina and be acceptable to the County.
- 1.5 The Contractor/vendor shall not cause any insurance to be canceled or permit any insurance to lapse. All insurance policies shall contain a clause to the effect that the policy shall not be canceled or reduced, restricted or limited, until fifteen (15) days after the County has received written notice, as evidenced by return receipt of registered or certified letter. Certificates of Insurance shall contain transcript from the proper office of the insurer, the location, and the operations to which the insurance applies, the expiration date, and the above-mentioned notice of cancellation clause.
 - 1.6 The information described above sets forth minimum amounts and coverages and is not to be construed in any way as a limitation on the Contractor's liability.

SECTION SEVEN
Payment and Performance Security

The Contractor shall provide and maintain payment and performance bonds in the amount of 100% of total job amount, inclusive of change orders.

SECTION EIGHT
Compliance with Legal Requirements

All applicable federal, state and local laws, ordinances, and rules and regulations of any authorities (including, but not limited to, any laws, ordinances or regulations relating to the S.C. Department of Revenue or the S.C. Board of Contractors) shall be binding upon the Contractor throughout the pendency of the Work. The Contractor shall be responsible for compliance with any such law, ordinance, rule or regulation, and shall hold the County harmless and indemnify same in the event of non-compliance as set forth in the Contract.

By signing this Contract, the Contractor certifies that it will comply with the applicable requirements of Title 8, Chapter 14 of South Carolina Code of Laws (1976, as amended), and agrees to provide to the State upon request any documentation required to establish either: (a) that Title 8, Chapter 14 is inapplicable to the Contractor and its subcontractors or sub-subcontractors; or (b) that the Contractor and its subcontractors or sub-subcontractors are in compliance with Title 8, Chapter 14.

Pursuant to Section 8-14-60, "A person who knowingly makes or files any false, fictitious, or fraudulent document, statement, or report pursuant to this chapter is guilty of a felony and, upon conviction, must be fined within the discretion of the Court or imprisoned for not more than five years, or both."

The Contractor agrees to include in any contracts with subcontractors, language requiring subcontractors to (a) comply with applicable requirements of Title 8, Chapter 14, and (b) include in its contracts with the subcontractors language requiring the sub-subcontractors to comply with the applicable requirements of Title 8, Chapter 14.

The Contractor agrees to and shall certify agreement to abide by the requirements under Title VI of the Civil Rights Act of 1964, and other non-discrimination authorities under Federal Executive Order Number 11246, as amended, and specifically the provisions of the equal opportunity clause.

The Contractor shall comply with all federal, state and local laws, ordinances, rules and regulations of any authorities throughout the duration of this Contract. The Contractor shall be responsible for compliance with any such law, ordinance, rule or regulation, and shall hold County harmless and indemnify same in the event of non-compliance.

SECTION NINE
Drug-free Workplace Act

The Contractor shall comply with the South Carolina Drug-free Workplace Act, Section 44-107-10 et seq., S.C. Code of Laws (1976, as amended). The County requires all Contractors executing contracts for a stated or estimated value of \$50,000 or more to sign a Drug-free Workplace Certification form prior to the issuance of the Notice to Proceed.

SECTION TEN
Material and Workmanship: Warranties and Representations

The Contractor represents that its staff is knowledgeable about and experienced in performing the Work required in this Contract and warrants that it will use best skill and attention to provide above described Work in a professional, timely manner.

Contractor warrants and represents that it shall be responsible for all subcontractors working directly for it, as well as for their Work product, as though Contractor had performed the Work itself.

- A. All equipment, materials and articles incorporated in the Work covered by the Contract and supplied by the Contractor are to meet the applicable SCDOT Standard Specifications, unless otherwise stated herein. Unless otherwise specifically provided in this Contract, reference to any equipment, material, article or patented process, by trade name, make or catalog number, shall not be construed as limiting competition. When requested, the Contractor shall furnish to the Purchasing Director, for approval the name of the manufacturer, the model number, and other identifying data and information respecting the performance, capacity, nature and rating of the machinery and mechanical and other equipment that the Contractor contemplates incorporating in the Work. When required by this Contract or when called for by the Purchasing Director, the Contractor shall provide full information concerning the material or articles which he contemplates incorporating in the Work. When so directed, samples shall be submitted for approval at the Contractor's expense, with all shipping charges prepaid. Machinery, equipment, material and articles installed or used without the required prior approval of the County shall be at the risk of subsequent rejection by the County.
- B. Any and all manufacturers' warranties on any equipment or materials will be passed on to the County and copies of said warranties will be furnished by the Contractor to the County upon completion and final acceptance of the Project.
- C. The Purchasing Director may, in writing, require the Contractor to remove from the Worksite any employee the Project Manager deems incompetent, careless or otherwise objectionable.
- D. In addition to any manufacturer's warranties, all workmanship and materials are warranted to be free from defects for a period of twelve (12) months after the date of Final Payment by the County.

SECTION ELEVEN
Retention of Records

The Contractor agrees to maintain for three (3) years from the date of Final Payment, or until the end of any audit or closure of all pending matters under this Contract, whichever is later, all books, documents, papers, and records pertinent to this Contract. The Contractor agrees to provide to the County, any federal grantor agency, the Comptroller General of the United States, any state grantor agency, any assignee, or any of their duly authorized representatives access to such books, documents, papers, and records for the purpose of examining, auditing, and copying them. The Contractor further agrees to include these provisions in any subcontracts issued in connection with this Contract.

SECTION TWELVE
State and Local Taxes

Except as otherwise provided, Contract prices shall include all applicable state and local taxes.

The Contractor shall calculate that portion of the Contract that is subject to the total South Carolina and local sales and/or use tax, which amount shall be itemized and shown on all invoices, and shall be paid to the SCDOR by the Contractor. If the Contractor is a non-South Carolina company, the County will withhold said amount from all invoices and remit payment to the SCDOR, unless Contractor furnishes County with a valid South Carolina Use Tax Registration Certificate Number.

The Contractor shall indemnify and hold harmless the County for any loss, cost, or expense incurred by, levied upon or billed to the County as a result of the Contractor's failure to pay any tax of any type due in connection with this Contract.

The Contractor shall ensure that the above sections are included in all subcontracts and sub-subcontract and shall ensure withholding on out of state sub and sub-subcontractors to which withholding is applicable.

SECTION THIRTEEN
Independent Contractor

The Contractor is an independent contractor and shall not be deemed the agent or employee of the County for any purpose whatsoever. The Contractor shall not hold himself out as an employee of the County, and shall have no power or authority to bind or obligate the County in any manner, except the County shall make payment to the Contractor for Work and expenses as herein provided. The Contractor shall obtain and maintain all licenses and permits required by law for performance of this Contract by him or his employees, agents, and servants. The Contractor shall be liable for and pay all taxes required by local, state or federal governments, including but not limited to social security, Workers' Compensation, employment security, and any other taxes and licenses or insurance premiums required by law. No employee benefits of any kind shall be paid by the County to or for the benefit of the Contractor or its employees, agents, or servants by reason of this Contract.

SECTION FOURTEEN
Inspection and Acceptance, No-Claim Affidavits

- A. All Work (which term includes, but is not restricted to materials, workmanship, manufacture and fabrication of components) shall be subject to inspection and test by the County at all reasonable times and places prior to acceptance. Any such inspection and test is for the sole benefit of the

County and shall not relieve the Contractor of the responsibility of providing quality supplies to comply with the Contract requirements. No inspection or test by the County shall be construed as constituting or implying acceptance of Work. Inspection or test shall not relieve the Contractor of the responsibility for damage to or loss of the material prior to acceptance, nor in any way affect the continuing rights (including warranty rights) of the County after acceptance of the completed Work. The Contractor shall conduct and pay for all tests required in the Scope of Work.

- B. The Contractor shall, without charge, replace any material or correct any workmanship found by the County not to conform to the Contract requirements, unless the County consents in writing to accept such material and workmanship with an appropriate adjustment in Contract Price. The Contractor shall promptly remove rejected material from the premises.
- C. Upon completion and acceptance of all Work, the Contractor shall provide the Project Manager with written affidavits. Such affidavits shall state that all claims arising by virtue of the Contract have been paid in full with any exceptions listed on such affidavits.
- D. Final acceptance of the completed project will be upon final payment to the Contractor. Upon final acceptance, the workmanship and material warranty period will begin.

SECTION FIFTEEN

Cleanup Work

- A. During progress of Work, Contractor will keep the Work Site and affected adjacent areas cleaned up. The Contractor will remove all rubbish, surplus materials, surplus excavates, and unneeded construction equipment so that the Work Site will be inconvenienced as little as possible.
- B. Where materials or debris have washed or flowed into or have been placed in existing watercourses, ditches, gutters, drains, pipes, or structures by work done under this Contract, the Contractor will remove and dispose of such material or debris during the progress of the Work.
- C. Upon completion of Work, the Contractor will leave all ditches, channels, drains, pipes, structures and work, etc. in a clean and neat condition.
- D. The Contractor will remove all debris from any grounds that have been occupied by the Contractor and leave the roads and all parts of the premises and adjacent site affected by the Contractor's operations in a neat and satisfactory condition.
- E. The Contractor will restore or replace, when and as directed, any public or private property damage by the Contractor's work, equipment or employees to a condition at least equal to that existing immediately prior to the beginning of the operations.

SECTION SIXTEEN

Conditions Affecting the Work

- A. The Contractor shall be responsible for having taken steps reasonably necessary to ascertain the nature and location of the Work and the general and local conditions which can affect the Work or the cost thereof. Any failure by the Contractor to do so will not relieve it from responsibility for successfully performing the Work without additional expense to the County. The County assumes

no responsibility for any understandings or representations concerning conditions or anything related to this Contract, made by any of its officers or agents prior to the execution of this Contract, unless such understandings or representations by the County are expressly stated in this Contract.

- B. The Contractor has visited and inspected the Work Site and accepts the conditions at the Work Site as they eventually may be found to exist and warrants and represents that this Contract can and will be performed under such conditions, and that all materials, equipment, labor and other facilities required because of any unforeseen conditions (physical or otherwise) shall be wholly at the Contractor's own cost and expense, anything in this Contract to the contrary notwithstanding.

SECTION SEVENTEEN
Safety of Persons and Property

- A. The following provisions are in addition to those pertinent sections contained in the standard specifications.
- B. The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to:
 - (i) Employees on the Work Site and other persons who may be affected thereby; and
 - (ii) The Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's subcontractors or sub-subcontractors; and
 - (iii) Other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.
- C. The Contractor shall give notices and comply with applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.
- D. The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting and maintaining danger signs and other warnings against hazards as long as such hazards exist. The Contractor shall also promulgate safety regulations and notify owners and users of adjacent sites and utilities of all construction and related activities.
- E. When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.
- F. The Contractor shall promptly remedy damage and loss (whether such damage or loss is insured under property insurance required by the Contract Documents or not) to property caused in whole or in part by the Contractor, a subcontractor, a sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible except damage or loss attributable to acts or omissions of the County or anyone directly or indirectly employed by it, or by anyone for whose acts the County may be liable,

and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 24, Indemnification, herein.

- G. The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the County.
- H. The Contractor shall not load or permit any part of the construction or site to be loaded so as to endanger its safety.
- I. In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's best discretion, to prevent threatened damage, injury or loss.

SECTION EIGHTEEN

Change Orders

One or more changes to the Work within the general scope of this Contract may be ordered by change order. The County may also issue construction change directives, as set forth below. The Contractor shall proceed with any such changes, and same shall be accomplished in strict accordance with the following terms and conditions:

- A. Change orders shall be submitted on the forms and pursuant to the procedures of the County. Change order shall mean a written order to the Contractor executed by the County after execution of this Contract, directing a change in the Work. A change order may include a change in the Contract Price, (other than a change attributable to damages to the Contractor for delay, which the Parties agree are not allowed under this Contract) or the time for the Contractor's performance, or any combination thereof. Where there is a lack of total agreement on the terms of a change order, the County may also direct a change in the Work in the form of a construction change directive, which will set forth the change in the Work and the change, if any, in the Contract Price or time for performance, for subsequent inclusion in a Change order.
- B. If applicable, any change in the Contract Price resulting from a Change order shall be determined by use of the Unit Prices set forth in the Contractor's bid.
- C. The execution of a Change order by the Contractor shall constitute conclusive evidence of the Contractor's contract to the ordered changes in the Work, this Contract as thus amended, the Contract Price, and the time for performance by the Contractor. The Contractor, by executing the Change order, waives and forever releases any claim against the County for additional time or compensation for matters relating to or arising out of or resulting from the Work included within or affected by the executed Change order.
- D. The Contractor shall notify and obtain the consent and approval of the Contractor's surety with reference to all Change orders if such notice, consent or approval is required by the County, the Contractor's surety or by law. The Contractor's execution of the Change order shall constitute the Contractor's warranty to the County that the surety has been notified of, and consents to, such Change order and the surety shall be conclusively deemed to have been notified of such Change order and to have expressly consented thereto.

SECTION NINETEEN
Claims and Disputes

- A. Definition. A Claim is a demand or assertion by one of the Parties seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, and extension of time or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the County and the Contractor arising out of or relating to the Contract. Claims must be made by written notice. The responsibility to substantiate Claims shall rest with the Party making the Claim. Following all limits and procedures herein shall be a condition precedent to the Contractor's entitlement to any increased compensation from any claim.
- B. Time Limits on Claims. Claims by either Party must be made within ten (10) business days after occurrence of the event giving rise to such Claim or within ten (10) business days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. An additional Claim made after the initial Claim has been implemented by change order will not be considered.
- C. Continuing Contract Performance. Pending final resolution of a Claim request for review of site conditions, request for information, or resolution of a dispute, unless otherwise agreed in writing the Contractor shall proceed diligently with performance of the Contract and the County shall continue to make payments in accordance with the Contract Documents.
- D. Waiver of Claims: Final Payment. The making of Final Payment shall constitute a waiver of Claims by the County except those arising from:
1. Liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
 2. Failure of the Work to comply with the requirements of the Contract Documents; or
 3. Terms of special warranties required by the Contract Documents.
- E. Claims for Additional Costs. If the Contractor wishes to make Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 17(I). If the Contractor believes additional cost is involved for reasons including but not limited to (1) an order by the County to stop the Work where the Contractor was not at fault, (2) a written order for a minor change in the Work, (3) failure of payment by the County, (4) termination of the Contract by the County, (5) other reasonable grounds, Claim shall be filed in accordance with the procedures established herein.
- F. Claims for Additional Time. See Section Five herein.
- G. Injury or Damage to Person or Property. If either Party to the Contract suffers injury or damage to person or property because of an act or omission of the other Party, of any of the other Party's employees or agents, or of others for whose acts such Party is legally liable, written notice of such injury or damage, whether or not insured, shall be given to the other Party within a reasonable time not exceeding Ten (10) Business Days after first observance. The notice shall provide sufficient detail to enable the other Party to investigate the matter. If a Claim for additional cost or time related to this Claim is to be asserted, it shall be filed as provided herein.

SECTION TWENTY
Damages for Delay

The Contractor agrees that if the Work, or any part thereof, is not completed within the time agreed upon in this Contract or any extension thereof, the Contractor or its sureties shall be liable to the County in the amount specified below for each and every calendar day the completion of the Work is delayed beyond the calendar date in this Contract, as fixed and agreed liquidated damages and not as a penalty; and the County shall have the right to deduct from and retain out of monies which may be then due or which may become due and payable to the Contractor, the amount of such liquidated damages; and if the amount so retained by the County is not sufficient to pay in full such liquidated damages, the Contractor shall pay to the County or its sureties the amount necessary to effect payment in full of such liquidated damages.

Any adjustment of the Contract time for completion of the Work granted in accordance with the provisions of this Contract will be considered in the assessment of liquidated damages.

Permitting the Contractor to continue and finish the Work or any part of it after the time fixed for its completion, or after the date to which the time for completion may have been extended, will in no way operate as a waiver on the part of the County of any of its rights under this Contract.

Schedule of Liquidated Damages for Each Day of Overrun in Contract Time:

Schedule of Liquidated Damages for Each Day of Overrun in Contract Time		
Original Contract Amount		Daily Charge per Calendar Day at Fixed Rate
From More Than	To and Including	
\$0	\$50,000	\$100.00
\$50,000	\$100,000	\$200.00
\$100,000	\$500,000	\$400.00
\$500,000	\$1,000,000	\$600.00
\$1,000,000	\$2,000,000	\$800.00
\$2,000,000	\$5,000,000	\$1,200.00
\$5,000,000	\$10,000,000 and	\$1,400.00
\$10,000,000	greater	\$1,800.00

Additional provisions concerning the Contractor's liability in certain specific events or circumstances are set forth throughout the Scope of Work. By signing this Contract, the Contractor expressly agrees to the terms thereof.

SECTION TWENTY-ONE
Suspension of Work

The Purchasing Director may order, in writing, the Contractor to suspend, delay, or interrupt all or any part of the Work for such period of time as he may determine to be appropriate for the convenience of the County. The County may suspend performance of its obligations under this Contract in good faith for the convenience of the County or to investigate matters arising in the Work.

The Purchasing Director may order suspension of the Work in whole or in part for such time as he deems necessary because of the failure of the Contractor to comply with any of the requirements of this Contract, and the Contract's completion date shall not be extended on account of any such suspension of Work.

When the Purchasing Director orders any suspension of the Work under the paragraph above, the Contractor shall not be entitled to any payment for Work with respect to the period during which such Work is suspended and shall not be entitled to any costs or damages resulting from such suspension.

The rights and remedies of the County provided in this Section are in addition to any other rights and remedies provided by law or under this Contract.

SECTION TWENTY-TWO
Modification of Contract

The County's Purchasing Director has the unilateral right to modify this Contract, within the general scope of the Work or the Project, when the modification is in the best interest of the County, provided however, the Contractor is given written notice of any such modification and the County is responsible for paying Contractor for any additional expenses incurred by Contractor that relate to the modification. Subject to the above, the Contractor shall immediately notify the County in writing of any proposed adjustment in its fee. The Contractor is obligated to perform the revised contract when so directed by the Purchasing Director and the County is obligated to pay for the work performed pursuant to the modification. No claim by the Contractor for an adjustment hereunder shall be allowed if asserted after Final Payment under this Contract.

SECTION TWENTY-THREE
Termination

A. For Convenience

The Purchasing Director, by advance written notice, may terminate this Contract when it is in the best interests of the County. If this Contract is so terminated, the Contractor shall be compensated for all necessary and reasonable direct costs of performing the Work actually accomplished. The Contractor will not be compensated for any other costs in connection with a termination for convenience. The Contractor will not be entitled to recover any damages in connection with a termination for convenience.

B. For Default

If the Contractor refuses or fails to perform the Work or any separable part thereof in a timely or workmanlike manner in accordance with the Contract Documents, or otherwise fails, in the sole opinion of the County, to comply with any of the terms and conditions of the Contract Documents deemed, in the sole opinion of the County, to be material (including, without limitation, the requirement that Contractor obtain and maintain in force all necessary permits), such refusal or failure shall be deemed a default under this Contract.

In the event of a default under this Section, the County shall have the right to terminate forthwith this Contract by written notice to the Contractor. In the event of such default, the advance notice period for termination is waived and the Contractor shall not be entitled to any costs or damages resulting from a termination under this section.

Whether or not the Contractor's right to proceed with the Work is terminated, it and its sureties shall be liable for any damage to the County resulting from Contractor's default. Any wrongful termination for default shall be deemed by the Parties a termination for convenience.

B. Termination for Non-Appropriation of Funds

The Purchasing Director, by written advance notice, may terminate this Contract in whole or in part in the event that sufficient appropriation of funds from any source (whether a federal, state, County or other source) are not made or sufficient funds are otherwise unavailable, in either case, to pay the charges under this Contract. If this Contract is so terminated, the Contractor shall be compensated for all necessary and reasonable direct costs of performing the Work actually provided to the date of such termination. The Contractor will not be compensated for any other costs in connection with a termination for non-appropriation. The Contractor will not be entitled to recover any damages in connection with a termination for non-appropriation, including, but not limited to, lost profits.

C. Rights Cumulative

The rights and remedies of the County provided in this Section are in addition to any other rights and remedies provided by law or under this Contract.

SECTION TWENTY-FOUR
Indemnification

Except for expenses or liabilities arising from the negligence or intentional acts of the County, the Contractor hereby expressly agrees to indemnify and hold the County harmless against any and all expenses and liabilities arising out of the negligent performance, action or inaction of the Contractor in conduct of this Contract, as follows:

For matters other than those arising from the rendering or failure to render professional services, the Contractor expressly agrees to the extent that there is a causal relationship between its negligence, action or inaction, or the negligence, action or inaction of any of its employees or any person, firm or corporation directly or indirectly employed by the Contractor and any damage, liability, injury, loss or expense (whether

in connection with bodily injury or death or property damage) that is suffered by the County and/or its officers or employees or by any member of the public, to indemnify and save the County and its officers and employees harmless against any and all liabilities, penalties, demands, claims, lawsuits, losses, damages, costs, and expenses arising out of the negligence, action or inaction of the Contractor, regardless of whether such liabilities, penalties, demands, claims, lawsuits, losses, damages, costs and expenses are caused in part by the County. Such costs are to include, without limitation, defense, settlement and reasonable attorney's fees incurred by the County and its employees. This promise to indemnify shall include, without limitation, bodily injuries or death occurring to the Contractor's employees and any person, directly or indirectly employed by the Contractor (including, without limitation, any employee of any subcontractor), the County's officers or employees, the employees of any other independent contractors, or occurring to any member of the public. When the County submits notice, Contractor shall promptly defend any aforementioned action.

The limits of insurance required in this Contract shall not limit the Contractor's obligations under this Section. The terms and conditions contained in this Section shall survive the termination of the Contract or the suspension of the Work hereunder. To the extent that any liabilities, penalties, demands, claims, lawsuits, losses, damages, costs and expenses are caused in part by the acts of the County, the Contractor's obligations shall be reduced in proportion to the County's fault. The obligations herein shall also extend to any actions by the County to enforce this indemnity obligation. The recovery of costs and fees shall extend to those incurred in the enforcement of this indemnity.

SECTION TWENTY-FIVE

Gratuities and Kickbacks

Gratuities. It shall be unethical for any person to offer, give or agree to give any employee or former employee, or for any employee or former employee to solicit, demand, accept, or agree to accept from another person a gratuity or an offer of employment in connection with any decision, approval, disapproval, recommendation, preparation or any part of a program requirement or a purchase request, influencing the content of any specification or procurement standard, rendering of advice, investigation, auditing, or in any other advisory capacity in any proceeding or application, request for ruling, determination, claim or controversy, or other particular matter pertaining to any program requirement of a contract or subcontract, or to any solicitation or proposal therefore.

Kickbacks. It shall be unethical for any payment, gratuity, or offer of employment to be made by or on behalf of a subcontractor under a contract to the prime contractor, or to hire any subcontractor or any person associated therewith, as an inducement for the award of a subcontract or order.

Violation of this clause may result in Contract termination.

SECTION TWENTY-SIX

Labor: Subcontractors: Employment Consideration

The Contractor shall not contract with a proposed person or entity to whom the County has made reasonable and timely objections. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable and timely objection.

The Contractor shall enforce strict discipline and good order among its employees and other persons carrying out the Contract.

Employment of labor by Contractor shall be effected under conditions which are satisfactory to County. Contractor shall remove or cause to have removed from the project any employee or employees who are considered unsatisfactory by the County.

The Contractor assumes the responsibility for assuring that its working forces are compatible with other forces on the job, and the Contractor is responsible for making himself aware of those forces. The Contractor will furnish a competent representative who is to be kept available to the site to represent the Contractor for the purpose of receiving notices, orders and instruction.

SECTION TWENTY-SEVEN

Other Contracts

The County reserves the right to undertake or award other contracts for additional work/services, and may elect to complete portions of the work/services included in this Contract using its own forces or through other contracts, and the Contractor shall fully cooperate with such other contractors, County employees and carefully fit its own work/services to such work/services as may be directed by the County. The Contractor shall not commit or permit any act by its forces or subcontractors which will interfere with the performance of work/services by any other contractor or by County.

SECTION TWENTY-EIGHT

Permits and Licenses

The Contractor shall, without additional expense to the County, be responsible for obtaining and maintaining all necessary licenses and permits required by the State of South Carolina, a municipality or the County or any other authority having jurisdiction. Prior to execution of a contract, the Contractor may be required to provide a copy of its current applicable Contractor's License issued by the State of South Carolina and the County. Any subcontractor must comply with the regulations promulgated in the South Carolina Contractor's Licensing Board as enforced by the South Carolina Licensing Board for Contractors. Contractor's (and or any subcontractor's) License Number, Person's Name and Business Name must all be shown on all required licenses.

SECTION TWENTY-NINE

Assignment

The Contractor shall not assign in whole or in part the Contract without the prior written consent of the County or its Assignee. The Contractor shall not assign any money due or that may become due to it under said Contract without the prior written consent of the County or its Assignee. Each Party binds itself, its successors, assigns, executors, administrators or other representatives to the other Party hereto and to successors, assigns, executors, administrators or other representatives of such other Party in connection with all terms and conditions of the Contract.

SECTION THIRTY
Controlling Law

The laws of South Carolina shall govern this Contract. All litigation arising under this Contract shall be litigated only in a nonjury hearing in the Court of Common Pleas, Fourteenth Judicial Circuit, Beaufort County, South Carolina.

SECTION THIRTY-ONE
Severance

Should any part of this Contract be determined by a Court of competent jurisdiction to be invalid, illegal, or against public policy, said offending Section shall be void and of no effect and shall not render any other Section herein, nor this Contract as a whole, invalid.

SECTION THIRTY-TWO
County's Designated Representative(s)

In the event that any questions or problems arise in the course of performing this Contract, Contractor shall immediately contact one or more of the following County representatives:

Beaufort County Engineering Department
David Thomas, Director
Beaufort County Purchasing Department
P.O. Drawer 1228
Beaufort, South Carolina 29901
843-255-2304

SECTION THIRTY-THREE
Notices

Whenever any provision of this contract requires the giving of written notice, it shall be deemed to have been validly given if delivered by person or by registered mail to the following:

If to the County:

David Thomas, Director
Beaufort County Purchasing Department
P.O. Drawer 1228
Beaufort, South Carolina 29901
843-255-2304

If to the Contractor:

Contractor Name
Contractor Address
City, State, Zip

SECTION THIRTY-FOUR
Non-Waiver

Any waiver of any default by either Party to this Contract shall not constitute waiver of any subsequent default, nor shall it operate to require either Party to waive, or entitle either Party to a waiver of, any subsequent default hereunder.

SECTION THIRTY-FIVE
Entire Contract

This Contract constitutes the entire understanding and Contract between the Parties hereto and supersedes all prior and contemporaneous written and oral contracts between the Parties and their predecessors in interest regarding the subject matter of this Contract. This Contract may not be changed, altered, amended, modified, or terminated orally, except as specifically provided, and any such change, alteration, amendment, or modification must be in writing and executed by the Parties hereto.

IN WITNESS WHEREOF, the Parties executed this Contract under their several seals the day and year first written above.

CONTRACTOR:

**BEAUFORT COUNTY, SOUTH
CAROLINA:**

Name:
Title:

Ashley Jacobs
County Administrator

Attest:

Attest:

1) 1) _____

2) 2) _____

At Beaufort, SC

END

FINAL AFFIDAVIT TO BEAUFORT COUNTY, SOUTH CAROLINA

I, hereby certify that all suppliers of materials, equipment and service, subcontractors, mechanics, and laborers employed by

or any of his subcontractors in connection with the construction of _____
at Beaufort County have been paid and satisfied in full as of _____, 20____,
and that there are no outstanding obligations or claims of any kind for the payment of which
Beaufort County on the above named project might be liable, or subject to, in any lawful
proceeding at law or in equity.

Signature _____

Title _____

Personally appeared before me this _____ day of _____, 20_____.

_____, who under oath deposes and says that he is
_____ of the firm of _____
that he has read the above statement and that to the best of his knowledge and belief same is an
exact true statement.

Notary Public _____

My Commission Expires _____

General Conditions

STANDARD GENERAL CONDITIONS OF THE
BEAUFORT COUNTY, SOUTH CAROLINA CONSTRUCTION CONTRACT

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ARTICLE 1
GENERAL PROVISIONS

1.1 BASIC DEFINITIONS

APPLICABLE CODE REQUIREMENTS - The term “Applicable Code Requirements” means all laws, statutes, the most recent building codes, ordinances, rules, regulations, and lawful orders of all public authorities having jurisdiction of the County, Contractor, and Subcontractor, the Project site, the Work, or the prosecution of the Work.

APPLICATION FOR PAYMENT - The term “Application for Payment” means the submittal from the Contractor wherein payment for certain portions of the Work is requested in accordance with Article 9.

BIDDER – The term “bidder” means one who submits a Bid directly to Owner, as distinct from a sub-bidder, who submits a bid to a Bidder.

BENEFICIAL OCCUPANCY - The term “Beneficial Occupancy” means the County’s right to make use of or otherwise occupy any part of the Work in accordance with Article 9.

CERTIFICATE FOR PAYMENT - The term “Certificate for Payment” means the approval of Contractor Application for Payment in accordance with Article 9.5.

CHANGE ORDER - The term “Change Order” means a Contract Document authorizing one or more of the following: a change in the Work, and adjustment in the Contract Sum, an adjustment in the Contract Time in accordance with Article 9.

CLAIM – See paragraph 4.3, Claims, of the General Conditions.

CONTRACT - The terms “Contract” means the written agreement between the Contractor and the County set forth in the Contract Documents.

CONTRACT DOCUMENTS - The “Contract Documents” consist of all documents listed in Article 5 of the Agreement.

CONTRACT MODIFICATION - The term “Contract Modification” means an executed Change Order.

CONTRACT PRICE - The term “Contract Price” means the amount of compensation payable by the County for completion of the Work in accordance with the Contract Documents.

CONTRACT SCHEDULE - The term “Contract Schedule” means the graphical representation of a practical plan to complete the Work within the Contract Time in accordance with Article 3.

CONTRACT TIME - The term “Contract Time” means the number of days set forth in the Agreement within which full completion of the Work must be achieved.

CONTRACTOR - The term “Contractor” means the person or firm identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number.

COUNTY – The term “County” means Beaufort County, South Carolina.

COUNTY’S REPRESENTATIVE – The term “County’s Representative” means the person or firm identified as such in the Agreement.

DAY - The term “day” as used in the Bidding Requirements and the Contract Documents shall mean calendar day, unless otherwise specifically stated.

DEFECTIVE WORK - The term “defective Work” means work that is unsatisfactory, faulty, omitted, incomplete, deficient, or does not conform to the requirements of the Contract Documents, directives of the County’s Representative, or the requirements of any inspection, reference standard, test, or approval specified in the Contract Documents.

DRAWINGS - The term “Drawings” means the graphic and pictorial portions of the Contract Documents showing the design, location, and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams. The Drawings are listed in the List of Drawings.

EXCUSABLE DELAY – The term “Excusable Delay” means a delay that entitles the Contractor to an adjustment of the Contract Time but not an adjustment to the Contract Price, pursuant to Articles 7 and 8 of the General Conditions.

EXTRA WORK – The term “Extra Work” means Work beyond or in addition to the Work required by the original Contract Documents, pursuant to Article 7 of the General Conditions.

FIELD ORDER – The term “Field Order” means a written order by the County which requires minor changes in the Work but does not involve a change in the Contract Price or Contract Times.

FINAL COMPLETION - The term “Final Completion” means the point at which the Work has been fully completed in accordance with the Contract Documents as determined by the County Engineer.

GENERAL CONDITIONS - The term “General Conditions” refers to the General Conditions of the Construction Contract, as included in the Contract Documents.

GENERAL REQUIREMENTS – The term “General Requirements” means the General Requirements of the Specifications which is the part of the Contract Document which amends or supplements the General Conditions with regard to Specifications.

PROJECT - The term “Project” means the total construction of which the Work performed under the Contract Documents may be the whole or part and which may include construction by separate contractors and/or the County. The Project may be identified by name, location, and/or project number in the Contract Documents.

SEPARATE CONTRACTOR - The TERM “Separate Contractor” means a person or firm under separate contract with the County performing other work at the project site which affects the Work performed under the Contract Documents.

SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES - See Paragraph 3.11, Shop Drawings, Product data, and Samples, of the General Conditions

SPECIFICATIONS - The term “Specifications” means that portion of the Contract Documents consisting of the written requirements for materials, equipment, construction systems, standards and workmanship for the work, and performance of related services.

SUBCONTRACTOR - The term “Subcontractor” means a person or firm that has a contract with the Contractor or with a Subcontractor to perform a portion of the Work. Unless otherwise specifically provided, the term Subcontractor includes subcontractors of all tiers.

SUBSTANTIAL COMPLETION - See Paragraph 9.8, Substantial Completion, of the General Conditions

SUCCESSFUL BIDDER – The term “Successful Bidder” means the lowest, qualified, responsible and responsive Bidder to whom Owner makes an award.

SUPERINTENDENT - The term “Superintendent” means the person designated by Contractor to represent Contractor at the Project site in accordance with Article 3.

TIER - The term “tier” means the contractual level of a Subcontractor or supplier with respect to the Contractor. For example, a first-tier Subcontractor is under subcontract with the Contractor, or a second-tier Subcontractor is under subcontract with the first-tier Subcontractor, and so on.

UNEXCUSABLE DELAY - The term “Inexcusable Delay” means a delay that does not entitle the Contractor to an adjustment of the Contract Sum and does not entitle the Contractor to an adjustment of the Contract Time.

WORK - The term “Work” means the construction and services required by the Contract Documents as modified by Change Order, whether completed or partially completed, and includes all labor, materials, equipment, tools, and services provided or to be provided by Contractor to fulfill Contractor’s obligations. The Work may constitute the whole or a part of the project.

WORK CHANGE DIRECTIVE – See paragraph 7.4, Work Change Directive, of the General Conditions.

1.2 Contract Document Interpretation

A. The Contract Documents are complementary and what is called for by one shall be as binding as if called for by all, except as may be otherwise stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the Contract Documents and the provisions of any standard, specification, manual, code or instruction incorporated by reference into the Contract Documents, or the provisions of any Laws or Regulations applicable to the performance of the Work unless such an interpretation would result in violation of such Law or regulation. If there is any conflict between the provisions of the Contract Documents and any referenced provisions, the language of the Contract Documents will take precedence over that of any standard specification, manual or code.

B. The following order of precedence shall govern the resolution of any disputes or ambiguities arising from this contract and the mutual intent of the parties (in order of priority). The Beaufort County Procurement Code will prevail over the Special Supplementary Conditions of this contract. Special and Supplementary Conditions of this contract will prevail over the standard form of agreement; the modified standard form of agreement shall prevail over the specifications, and the specifications shall prevail over the drawings and general conditions.

C. The Contract Documents are intended to include and require all items which are necessary for the proper execution and completion of the Work.

D. Interpretations of the Drawings and Specifications and their intent, which are necessary to the proper execution, and completion of the Work will be made by the County’s Representative or Architect/Engineer. Words which have well known technical or trade meanings are to be interpreted in accordance with such recognized meanings. Contractor shall refer issues concerning interpretation and compliance with the contract documents and plans and specifications to the County’s Representative in writing, or the architect/engineer in writing. The County’s Representative or Architect/Engineer will review such requests with reasonable promptness and within any time limits agreed upon. The County may consider the interpretation and decision of the Architect/Engineer and issue a decision after consultation with the Architect/Engineer. Failure by the claimant to give written notice as set forth above within thirty days shall result in Architect/Engineer’s decision being final and binding upon the County and Contractor. The County’s decision shall be final.

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

F. In the event of an inconsistency between Drawings and Specifications or within either document, the better quality or greater quantity of work shall be provided, at no additional cost to the Owner.

ARTICLE 2

COUNTY

2.1 Provided by the County

The County shall furnish survey's describing the physical characteristics and legal limitations required to perform the Work. The Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of the County. Contractor shall report to the County's representative or Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or monuments by professionally qualified personnel. As for utility locations for the contract site, the Contractor is encouraged to contact independent utility locators, such as Palmetto Utility Locations (1-800-922-0983), to verify and locate utilities. The Contractor shall bear all costs and all risks for proper location and/or damage or destruction to utilities in place.

2.1 Right to Stop the Work

The County may at any time and without cause suspend the Work or any portion thereof by notice in writing to the Contractor which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be allowed an extension of the Contract Times.

2.2 Right to Carry Out the Work

If the Contractor fails to carry out the Work in accordance with the Contract Documents, fails to provide sufficient labor, materials, equipment, tools, and services to maintain the Contract Schedule, or otherwise fails to comply with any material term of the Contract Documents, and fails within 2 working days after receipt of notice from the County to promptly commence and thereafter diligently continue to completion the correction of such failure, the County may, without prejudice to other remedies the County may have, correct such failure at Contractor's expense. In such case, the County will be entitled to deduct from payments then or thereafter due Contractor the cost of correcting such failure, including compensation for the additional services and expenses of the County's Representative, Engineer, and County's consultants made necessary thereby. If payments then or thereafter due Contractor are not sufficient to cover such amounts, Contractor shall pay the additional amount to the County.

ARTICLE 3

CONTRACTOR

3.1 Review of Contract Documents and Field Conditions by Contractor

A The Contractor shall carefully study and compare each of the Contract Documents with the others and with the information furnished by the County, and shall promptly report in writing to the County's Representative any errors, inconsistencies, or omissions in the Contract Documents. Contractor shall take field measurements, verify field conditions, and carefully compare with the Contract Documents such field measurements, conditions, and other information known to the Contractor before commencing Work. If the Contractor performs any construction activity which Contractor knows or should know involves an error, inconsistency, or omission without notifying and obtaining the written consent of the County's Representative, the Contractor shall be responsible for the resultant losses, including without limitation, the costs of correcting the Work.

B Contractor shall be responsible for all direct costs to County resulting from Contractor's errors and omissions in his interpretation of construction documents and the performance or work under the Contract Document, or those of his subcontractors and suppliers, and shall be responsible for all additional Architect/Engineer fees and other costs related to correcting such errors and omissions. Such additional costs shall include Architect/Engineer Punch List, inspection(s) or the Building Codes Enforcement inspections, as such, re-inspections are made necessary where no Certificate of Substantial Completion and/or Occupancy Permit could be issued because of Contractor's unsatisfactory performance or preparation on the date the original inspection was scheduled and performed.

C County shall furnish to Contractor one (1) copy of the Contract Documents. Additional copies will be furnished, upon request, at the cost of reproduction.

3.2 Subsurface and Physical Conditions

A. Reports and Drawings: The Supplementary Conditions identify:

- those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Contract Documents; and
- those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Contract Documents.

B. Limited Reliance by Contractor on Technical Data Authorized: Contractor may rely upon the general accuracy of the “technical data” contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such “technical data” is identified in the Supplementary Conditions. Except for such reliance on such “technical data,” Contractor may not rely upon or make any Claim against County, County’s Architect/Engineer, or any of Architect’s/Engineer’s Consultants with respect to:

- the completeness of such reports and drawings for Contractor’s purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
- other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
- any Contractor interpretation of or conclusion drawn from any technical data or any such other data, interpretations, opinions, or information.

3.3 Supervision and Construction Procedures

Contractor shall supervise, coordinate, and direct the Work using Contractor’s best skill and attention. Contractor shall be solely responsible for and have control over construction means: methods, techniques, sequences, procedures and the coordination of all portions of the Work. Contractor shall be responsible to the County for acts and omissions of Contractor’s agents, employees, and Subcontractors, and their respective agents and employees. Contractor shall not be relieved of Contractor’s obligations to perform the Work in accordance with the Contract Documents either by acts or omissions of the County or County’s Representative in the administration of the Contract, or by tests, inspections, or approvals required or performed by persons or firms other than the Contractor. Contractor shall be responsible for inspection of all portions of the Work, including those portions already performed under this Contract, to determine that such portions conform to the requirements of the Contract Documents and are ready to receive subsequent Work. Contractor shall at all times maintain good discipline and order among its employees and Subcontractors. Contractor shall provide competent, fully qualified personnel to perform the Work.

3.4 Labor and Materials

The Contractor shall provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work in accordance with the Contract Documents. Only manufactured and farm products of the United States, preferably in the State of South Carolina shall be used as materials in the prosecution of the Work under this contract. Contractor shall warrant that all equipment and materials provided under this Contract are new, merchantable, and fit for the purpose intended.

3.5 Contractor Warranty

Contractor warrants to the County that all materials furnished under this Contract will be of good quality, new, and free of liens, claims, and defects, and that the Work will conform professional standards of care and practice in effect at the time the Work is performed, be of the highest quality, and free from all faults, defects or errors and in compliance with the requirements of the Contract Documents. If the Contractor is notified in writing of a fault, deficiency or error in the Work provided within (1) one year of final payment for the Work, the Contractor shall, at the County’s option, either re-perform such portions of the Work to correct such fault, defect or error, at no additional cost to the County, or refund to the County, the charge paid by the County, which is attributable to such portions of the faulty, defective or erroneous Work, including costs for re-performance of the Work provided by other Contractors.

3.6 Taxes

The Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by the contractor. The County, as a public body, is not exempt from South Carolina State Sales and Use Taxes on materials and equipment incorporated in the Work, and said taxes shall be included in the Unit Price. Contractor is responsible for obtaining and executing the forms necessary for claiming the exemption.

3.7 Permits and Fees

Unless otherwise provided in the Supplemental Conditions, the Contractor shall obtain and pay for all permits, licenses, and certificates required for the proper execution and completion of Work under this Contract. When electrical, water, and/or gas service is included in the specifications, everything necessary to make the system operational, including any and all utility company connection/equipment charges, shall be included in the bid. This shall apply even when permit fees are waived. Contractor shall, at its own expense, meter and pay the cost of the water supply, electrical, light and power, heat, and telephone services during construction of the project. Connection to existing facilities for temporary services and their distribution for the construction work shall be installed in a manner and location subject to approval of the owner. When temporary service lines and meters are no longer required, they shall be removed by the Contractor. Any part of the permanent service lines, grounds, and buildings of the permanent service lines, grounds, and buildings are disturbed or damaged by the installation and/or removal of the temporary service lines, they shall be restored to their original condition by the Contractor in an amount satisfactory and subject to the County's approval.

3.8 Supervision

Contractor shall supervise, inspect, and direct the Work completely and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction, but Contractor shall not be responsible for the negligence of the County or the Engineer in the design or specification of a specific means, method, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents. Contractor shall be responsible to see that the complete Work complies accurately with the Contract Documents.

3.9 Schedules Required of the Contractor

A Contractor shall start Work no later than ten (10) days after receipt of the Notice to Proceed. Before the commencement of Work, the Contractor shall submit a computerized schedule of the work necessary to complete the project to the County's Representative for review at the time of the pre-construction meeting. Approved computer formats are Microsoft Project, SureTrac/Primavera or approved equal. The Estimated Progress Schedule as submitted by Contractor for review by the County's Representative shall provide an orderly progression of the Work to completion within the Contract Time, and shall indicate starting and completion dates for the various stages of the Work. The dates so indicated on the schedule are hereby made time of the essence.

- Contractor shall provide a monthly update to the progress schedule to the County's Representative. All costs for furnishing and updating the progress schedule shall be included in the price bid.

B The preliminary progress schedule and updated progress schedules shall represent a practical plan to complete the Work within the Contract Time. Extension of any schedule beyond the Contract Time shall not be acceptable. Schedules showing the Work completed in less than the Contract Time, may be acceptable if judged by County's Representative to be practical, however acceptance of such a schedule shall not change the Contract Time. The Contract Time, not the schedule time, shall control in the determination of liquidated damages payable by Contractor under Article 8 of the Agreement in the determination of any delay under Article 8 of the General Conditions.

C If a schedule showing the Work completed in less than the Contract Time is accepted, Contractor shall not be entitled to extensions of the Contract Time for Excusable Delays until such delays extend the completion of the Work beyond the expiration of the Contract Time.

D Contractor shall provide a separate schedule for the submittal of shop drawings and samples for County approvals. The preliminary schedule of Shop Drawings shall include a list of proposed Shop Drawings with the proposed time of submission for each keyed to the estimated progress schedule described in these General Conditions. The Schedule of Shop Drawings shall be adjusted, if necessary, to reflect any changes in the

estimates on the adjusted progress schedule.

E Contractor shall provide a preliminary schedule of values for all of the Work which includes quantities and prices of items, when added together, equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. For each Work item and monthly period, the estimated percentage completion shall be tabulated. Unit Price Work shall be estimated based upon quantities given in the Bid Form. The total percentage for each Work item should equal 100 percent.

- The schedule of values shall be adjusted during the performance of the Work, if necessary, to reflect actual and estimated conditions.

3.10 Initial Acceptance of Schedules

A. Unless otherwise provided in the Contract Documents, at least ten days before submission of the first Application for Payment a conference attended by Contractor, County's Representative, and others as appropriate will be held to review for acceptability to County's Representative as provided below the schedules submitted in accordance with paragraph 3.8

B. Contractor shall have an additional ten days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to County's Representative.

- The progress schedule will be acceptable to County's Representative if it provides an orderly progression of the Work to completion within any specified Milestones and the Contract Times. Such acceptance will not impose on County's Representative responsibility for the progress schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve Contractor from Contractor's full responsibility therefore.
- Contractor's schedule of Shop Drawing and Sample submittals will be acceptable to County's representative if it provides a workable arrangement for reviewing and processing the required submittals.
- Contractor's schedule of values will be acceptable to County's Representative as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

3.11 As Built Documents

Contractor shall maintain one set of As-Built drawings and specifications at the project site, which shall be kept up to date during the Work of the Contract. All changes which are incorporated into the Work which differ from the documents as drawn and written shall be noted on the As-built set. Notations shall reflect the actual materials; equipment and installation methods used for the Work and each revision shall be initialed and dated the Contractor's Superintendent.

3.12 Substitutions

A Bids shall be based on the exact materials specified. The specified products have been used in the design of the Project and in the preparation of the Drawings and Specifications, and as such establish minimum standards of function, dimension, appearance, and quality necessary for the Project. Equivalent products of other manufacturers may be acceptable, if, in the judgment of the County's Representative or Architect/Engineer, they meet the standards of the Specifications. The burden of proof of equality rests with the Contractor. The Contractor shall submit in writing any requests for substitutions. Shop Drawings that are submitted to the Architect do not constitute a request for substitution. Materials not specified or accepted as equivalent shall not be acceptable for installation.

B. Unless the specifications or description provides for "or equal", "equivalent", or other similarly descriptive words, the Contractor shall provide the material or items as specified. Contractor may submit, by written application, items for County's Representative or Architect/Engineer review as "equal" if:

- In the County Representative's or Architect's/Engineer's sole discretion, an item is functionally equal to and similar in that no change to the Work will be required, it may be considered by the County's Representative or Architect/Engineer as an "equal" item, in which instance review and approval of the

proposed item may, in the County Representative's or Architect's/Engineer's sole discretion be accomplished without compliance to some or all of the requirements for approval of substitute items. In such cases the item shall be determined by the County Representative or Architect/Engineer to be at least equal in quality, durability, strength, appearance, and design criteria, and it will meet the design performance requirements equally well, and Contractor certifies that there is: i) no increase in cost to the County, and (ii) it will conform to the requirements of the item named in the Contract Documents.

C. Prior to initiating the written application required under paragraph 3.12B of the General Conditions, Contractor shall briefly outline the proposed substitute to the extent necessary for the County's Representative or Architect/Engineer, if deemed appropriate by the County's Representative or Architect/Engineer, to estimate the cost of engineering services for any redesign which may be required for evaluating a proposed substitute. The County Representative's or Architect's/Engineer's estimate shall be incorporated in the Contractor's application for the proposed substitute in the itemization of estimated costs required in accordance with paragraph 3.12B of the General Conditions. The County Representative's or Architect's/Engineer's estimate will also serve to advise Contractor of the reimbursement to County when evaluation so indicates.

3.13 Shop Drawings and Samples

A. Contractor shall submit six (6) copies of Shop Drawings to the County's Representative for review and approval in accordance with the schedule of Shop Drawing and Sample Submittals. Contractor shall also submit Samples to the County's Representative, in accordance with the schedule of Shop Drawing and Sample Submittals. Contractor shall have determined and verified fit, form, function, performance criteria, and coordinated each Shop Drawing or Sample with the other Shop Drawings or Samples and with the requirements of the Work and the Contract Documents. By approving and submitting Shop Drawings, Product Data, Samples, and similar submittals, Contractor represents that it has determined or verified materials and field measurements and conditions related thereto, and that it has checked and coordinated the information contained within such submittals with the requirements of the Contract Documents and Shop Drawings for related Work.

B. Any Work performed prior to County's Representative review and approval of the pertinent submittal will be at the sole expense and responsibility of the Contractor. The Contractor shall submit structural, mechanical, and electrical shop drawings in the form of one sepia and three black or blue line prints; all other shop drawings in the form of one sepia and two black or blue prints.

C. Contractor shall not be relieved of the responsibility for deviations from the requirements of the Contract Documents by County Representative's review of Shop Drawings, Product Data, Samples or other similar submittals, unless Contractor has specifically informed County's Representative at the time of the submittal and County's representative has given written approval of the specific deviation. Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals by County Representative's review, acceptance, comment, or approval thereof.

D. Final approval of all materials shall be contingent on Shop Drawing acceptance, compliance with the Specifications and performance criteria, and acceptable installation. General approval to utilize a product does not relieve the supplier or Contractor of meeting Specification requirements.

E. Other submittals required under the Contract Documents shall be made in the same number of copies as required for Shop Drawings, unless otherwise indicated.

3.14 Use of Site and Clean Up

The Contractor shall confine operations at the project site to areas permitted by the Construction Documents. Contractor shall, during the performance of the Work keep the project site and surrounding area free from accumulation of waste materials and rubbish cause by Contractor. Contractor shall not unreasonably encumber the Project site with materials or equipment. Contractor shall remove all waste material and rubbish cause by the Contractor; tools; equipment; machinery; and surplus materials from the project site and surrounding area at the completion of the Work.

3.15 Access to Work

The County's Representative, employees, and consultants and other persons authorized by the County shall at all times have access to the Work whenever it is in progress.

3.16 Hours of Work

The hours of Work for the Project shall be consistent with the hours of normal operation of the Beaufort County Engineer, unless otherwise specified within the Supplemental Conditions. That is Monday through Friday from 8:00 a.m. to 5:00 p.m. The County Engineer may agree to waive these time requirements upon written request from the Contractor. The Contractor is made aware that the hours accumulated by the Engineer and/or his staff process, working, or otherwise attending to the Contract as it relates to overtime hours generated by the Contractor's work hours or delinquencies, shall be assessed to the Contractor. The Beaufort County pay scale will govern with County employees wage rates as applicable. Reimbursement would be processed as a contract reduction via a supplemental agreement or Change Order.

3.17 Concealed or Unknown Conditions

A Except and only to the extent provided otherwise in Articles 7 and 8 of the General Conditions, by signing the Agreement, Contractor agrees:

- To bear the risk of concealed or unknown conditions, if any, which may be encountered in performing the Contract; and
- That Contractor's bid for the Contract was made with full knowledge of this risk.

In agreeing to bear the risk of concealed or unknown conditions, Contractor understands that, except and only to the extent provided otherwise in Articles 7 and 8, concealed and/or unknown conditions shall not excuse Contractor from its obligation to achieve full completion of the Work within the Contract Time, and shall not entitle the Contractor to an adjustment of the Contract Sum.

B Any information provided pursuant to INFORMATION AVAILABLE TO BIDDERS is subject to the following provisions: The information is made available for the convenience of Bidders and is not parts of the Contract. The County has not determined the accuracy or completeness of such information, and all such information is made available to Bidders without a representation or warranty by the County whatsoever as to its accuracy, completeness, or relevancy. Bidders shall independently evaluate such information for their use and shall be solely responsible for use or interpretation of such information. Any such use or interpretation shall not be the basis of any claim against County.

C If concealed or unknown conditions are encountered which require, in opinion of County's Representative, design details which differ from those design details shown in the Contract Documents and the County's Representative finds that such revised design details will cause an increase or decrease in the cost of, or time required for performance of the Contract, and if County agrees with County Representative's determinations, County will issue a Change Order modifying the Contract terms to provide for the change in design details and to provide for an adjustment in the Contract Sum and/or Contract Time pursuant to Articles 7 and 8.

D If Contractor encounters concealed or unknown conditions that differ materially from those anticipated or expected, Contractor shall immediately notify County's Representative in writing of such conditions so that County's Representative can determine if such conditions require design details which differ from those design details shown in the Contract Documents. Contractor shall be liable to County for any extras costs incurred as the Contractor's failure to promptly give such notice.

3.18 Test and Inspections

The Contractor shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by Contract Documents, unless otherwise specified in the Supplemental Conditions. All inspections, tests or approvals other than those required by Laws or Regulations of any public body having jurisdiction shall be performed by an organization acceptable to the County, Contractor, and Engineer. Engineer will receive and review certificates of inspection, tests, or approvals which are submitted in accordance with the Contract Documents, but such review will be only to determine that their content complies with the requirements of, and the certified results indicate compliance with, the Contract Documents.

3.19 Acceptance

The Work under this agreement shall remain the property of and responsibility of the Contractor until it is accepted by the County. The Contractor shall be liable for any and all damages and losses to the Project (weather by fire, theft, vandalism, hurricane, earthquake, flood, or otherwise) prior to the County's acceptance as fully completed. In the event the Work furnished under this Agreement is found to be defective or does not conform to the specifications, the County reserves the right to cancel the Agreement upon written notice to the Contractor.

3.20 Indemnification

Contractor shall indemnify and save harmless the County, its officers, agents, and employees from and against all liability, loss, costs, claims, damages, judgments, and awards, whether or not covered by insurance, arising or claimed to have arisen: (a) or in part from acts or omissions of, or as a result of Work done or omitted from being done by Contractor, Subcontractors or assignees and their agents or employees, which resulted in: (1) injury to (including mental or emotional) or death of any person, including employees of the County or Contractor, or (2) damage to or destruction of any property, real or personal, including without limitation property of the County, County's employees and fellow employees; (b) out of injuries sustained and/or occupational diseases contracted by Contractor's, its subcontractor's, or assignee's employees, if any, of such a nature and arising under such hereto, of the state having jurisdiction, including all claims and causes of action of any character against the County by any employee of Contractor, its subcontractors or assignees, or the employer of such employees, or any person or concern claiming by, under or actions or disputes asserted by any subcontractors, employees or suppliers of Contractor. Indemnification shall include all costs including attorney's fees reasonably incurred in pursuing indemnity claims under or enforcement of the Contract.

ARTICLE 4

ADMINISTRATION OF THE CONTRACT

4.1 County's Representative

A. The County's Representative will provide administration of the Contract as provided in the Contract Documents and will be the representative of the County. The County's Representative will have the authority to act on behalf of the County only to the extent provided in the Contract Documents. The County's Representative will not have control over, be in charge of, and will not be responsible for construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the Work, since these are solely the Contractor's responsibility. Based on the County's Representative's site visits and evaluations of Contractor's Applications for Payment, the County's Representative will recommend amounts, if any due Contractor and will issue approval for payment in such amounts. However, no actions taken during such site visits shall relieve the Contractor of the Contractor's obligations as described in the Contract Documents. The County's Representative will have authority to reject the Work, or any portion thereof, which does not conform to the Contract Documents. The County's Representative will have the authority to stop the Work or any portion thereof. The County's Representative will be, in the first instance, the interpreter of the requirements of the Contract Documents and the judge of performance thereunder by the Contractor. Should the Contractor discover and conflicts, omissions, or errors in the Contract Documents: have questions about the interpretation or clarification of the Contract Documents ; question whether Work is within the scope of the Contract Documents; or question that Work is not sufficiently detailed or explained, then before proceeding with the Work affected, the Contractor shall notify the County's Representative in writing and request interpretation, clarification, or furnishing of additional detailed instructions. The County's Representative response to questions and requests for interpretations, clarifications, instructions, or decisions will be made with reasonable promptness. Should the Contractor proceed with the Work affected before receipt of a response from the County Representative's interpretations, clarifications, instructions, or decisions shall be removed or replaced and Contractor shall be responsible for all resultant rework and/or losses.

B. If County and Architect/Engineer agree, Architect/Engineer will furnish a Resident Project Representative to assist in providing more extensive observation of the Work. The duties, responsibilities and limitations of any Resident Project representative and assistants furnished by the Architect/Engineer are as set-forth in Exhibit SC-A, "A Listing of the Duties, Responsibilities and Limitations of Authority of the Resident Project Representative" which is attached hereto and made a part hereof.

4.2 Contractor Change Order Request

Contractor may request changes to the Contract Sum and/or Contract Time for Extra Work or Delays to completion of the Work caused by the acts, errors, or omissions of the County, County's Representative, their agents or employees, or caused by unforeseen conditions if, and only if Contractor follows the procedures specified in this Paragraph 4.2. As used in this Paragraph 4.2. Such acts, errors, or omissions shall include, but not be limited to, the provision of clarifications, drawings, instructions, or interpretations that involve Extra Work or delay completion of the Work. If Contractor asserts that Contractor is entitled to an adjustment of the Contract Sum and/or the Contract Time as the result of an act, error, or omission of the County, the County's Representative, their agents or employees, or as the result of unforeseen conditions, then Contractor may submit a Change Order Request to County's Representative. A Change Order Request must state that it is a Change Order Request, state and justify the reason for the request, and specify the amount of any requested adjustment to the Contract Sum and/or Contract Time. Upon request of County's Representative, Contractor shall submit such additional information concerning the Change Order Request as may be requested by County's Representative for the purpose of evaluating the Change Order Request. If the Change Order Request seeks an adjustment of the Contract Sum for delay, upon request of County's Representative, Contractor shall submit written documentation demonstrating Contractor's entitlement to such an adjustment under Article 8. A condition precedent to obtaining an adjustment of the Contract Sum and/or Contract Time as a result of an act, error, or omission of the County, the County's Representative, their agents or employees, or as the result of an unforeseen condition, is timely submission of a Change Order Request that meets the requirements set forth above. A Change Order Request based upon such acts, errors or omissions will be deemed timely submitted, if and only if, it is submitted within 3 working days of the date the Contractor discovers, or reasonably should discover that an act, error, or omission of the County, the County's Representative, their agents or employees, has occurred that may entitle Contractor to an adjustment of the Contract Sum and/or Contract Time (even if the Contractor has not been damaged, delayed, or incurred extra cost when the Contractor discovers, or reasonably should discover, the act, error or omission giving rise to the Change Order Request). A Change Order Request based upon an unforeseen condition will be deemed timely Submitted if, and only if, it is submitted within 3 working days of the date the Contractor discovers, or reasonably should discover, the existence of an unforeseen condition that may entitle Contractor to an adjustment of the Contract Sum and/or Contract Time (even if the Contractor has not been damaged, delayed, or incurred extra cost when the Contractor discovers, or reasonably should discover, the unforeseen condition giving rise to the Change Order Request). If County's Representative issues a final decision on all or part of Change Order Request, the Contractor may contest the decision by filing a timely Claim under the procedures specified below. A final decision is any decision on a Change Order Request which states that it is final. Failure of the claimant to give written notice as set forth above within thirty days shall result in the County representative's decision being final and binding upon County and Contractor.

4.3 Claims

The term "Claim" means a written demand or assertion by Contractor seeking an adjustment or interpretation of the terms of the Contract Documents, payment of money, extension of time, or other relief with respect to the Contract Documents, including a determination of disputes or matters in question between County and Contractor arising out of or related to the Contract Documents or the performance of the Work, and claims alleging an unforeseen condition or an act, error, or omission by County, County's Representative, their agents or employees.

If a Claim is subject to the procedures specified in Paragraph 4.2, the Claim arises upon the issuance of a written final decision denying in whole or in part Contractor's Change Order Request. If a Claim is not subject to the procedures specified in Paragraph 4.2, the Claim arises when the Contractor discovers, or reasonably should discover, the condition or event given rise to the Claim (even if the Contractor has not been damaged, delayed, or incurred extra cost when the Contractor discovers, or reasonably should discover, the condition or event giving rise to the Claim). A Claim not subject to the procedures specified in Paragraph 4.2 may be asserted if, and only if, the Contractor gives a valid written notice of intent to file the Claim within 3 working days of the date the Claim arises. A written notice of intent to file a claim will be deemed valid if, and only if, it identifies the event or condition giving rise to the Claim and states its probable effect, if any, with respect to the Contractor's entitlement to an adjustment of the Contract Sum and/or the Contract Time.

4.4 Assertion of Claims

Claims by Contractor shall be first submitted to County's Representative for decision. Notwithstanding the making of any Claim or the existence of any dispute regarding any Claim, unless otherwise directed by County's Representative, Contractor shall not cause any delay, cessation, or termination in or of Contractor's performance of

the Work, but shall diligently proceed with performance of the Work in accordance with the Contract Documents. County will continue to make payments in accordance with the Contract Documents. Contractor shall submit a Claim in writing, together with the supporting data specified in Paragraph 4.3 to County's Representative as soon as possible but not later than 7 days after the date the claim arises under Paragraph 4.3.

4.5 Time Limits and Timely Notice of Contractor Claims

Contractor agrees to provide Owner and architect with written notice within seven (7) days of the occurrence of any event giving rise to any claim for additional compensation or extension of time under this agreement, whether such claim is based upon claims for changes, differing site conditions, adverse weather conditions, or any cause whatsoever. Contractor waives any claims for additional compensation or time extension, if Contractor fails to timely notify the Owner and architect in accordance with the terms and conditions of this clause. Contractor further acknowledges that any work which the Contractor considers to be beyond the scope of original work and which the Contractor elects to perform, prior to notice to Owner and architect and Owner's written approval to proceed with additional work, shall be performed at the Contractor's peril and as a gratuity to the Owner. Contractor assumes all risk associated with such work, agrees to perform such work at its own costs, and released and holds Owner harmless for any and all costs of such work performed prior to notice and written approval of such additional work by Owner.

4.6 Decision of County's Representative on Claims

County's Representative decision on any or all claims shall be considered as final. Disputes shall be resolved through litigation in a Court of competent jurisdiction in Beaufort, South Carolina.

ARTICLE 5

SUBCONTRACTORS

5.1 Award of Subcontracts to Other Contractors for Portions of the Work

Contractor shall submit to County, on its letterhead, prior to commencement of the Work, a list of all Subcontractors to be used to perform the Work. If County objects to any Subcontractor, Contractor shall provide a substitute Subcontractor acceptable to County with no adjustment of the Contract Sum. No substitution of Subcontractors shall be made without County's consent. All Subcontracts shall incorporate the Contract Documents by reference. Contractor hereby assigns to County all of its interests in Subcontracts affecting the Work, effective only if County terminates the Contract for cause and only for Subcontracts designated by County within 30 days after the date of termination. Nothing contained in the Contract Documents shall create any contractual relationship between any Subcontractor and County, except when, and only to the extent that, County elects to accept the assignment of the subcontract with such Subcontractor.

5.2 Separate Contractor Claims

Should Contractor cause damage to the work or property of any separate contractor at the site, or should any claim arising out of Contractor's performance of the Work or lack of same at the site be made by any separate contractor against Contractor, County, Engineer, or any other person, Contractor shall promptly attempt to settle with such other contractor by agreement, or to otherwise resolve the dispute by arbitration or at law. Contractor shall indemnify and hold County and Engineer harmless from and against all claims, damages, losses and expenses (including, but not limited to, fees of engineers, architects, attorneys and other professionals and court and arbitration costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any separate contractor against County and Engineer to the extent based on a claim arising out of Contractor's performance or lack of same of the Work. Should a separate contractor cause damage to the Work or property of Contractor or should the performance of Work or lack of same by any separate contractor at the site give rise to any other claim, Contractor shall not institute any action, legal or equitable, against County or Engineer or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from County or Engineer on account of any such damage or claim. If Contractor is delayed at any time in performing or furnishing Work by any act or neglect of a separate contractor and County and Contractor are unable to agree as to the extent of any adjustment in Contract Time attributable thereto, Contractor may make a claim for an extension of time in accordance with Article 4. An Extension of the Contract Time shall be Contractor's exclusive remedy with respect to County and Engineer for any delay, disruption, interference or hindrance caused by any separate contractor. This paragraph does not prevent recovery from Contractor or Engineer for activities that are their respective responsibilities.

ARTICLE 6

CONSTRUCTION BY COUNTY OR BY SEPARATE CONTRACTORS

6.1 County's right to Perform Construction and to Award Separate Contracts

County may perform Work on the Project site, including Work which has been deleted from the Contract by Change Order, with County's own forces or with Separate Contractors. Contractor shall cooperate fully with County's forces and Separate Contractors at the Project site and coordinate the scheduling and performance of the Work with the scheduling and performance of Work to be performed by County's forces or Separate Contractors. Contractor shall give County's forces and Separate Contractors reasonable opportunity to deliver and store materials and equipment on the Project site.

6.2 Mutual Responsibility

A. Contractor shall afford County and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities. Contractor shall connect, schedule, and coordinate its construction and operations with the construction and operations of County and Separate Contractors as required by the Contract Documents.

B. If a portion of the Work is dependent upon the proper execution or results of other construction or operations by County or Separate Contractors, Contractor shall inspect such other construction or operations before proceeding with that portion of Work. Contractor shall promptly report to County's Representative apparent discrepancies or defects which render the other construction or operations unsuitable to receive the Work. Contractor shall not proceed with the portion of Work affected until apparent discrepancies or defects have been corrected. Failure of Contractor to so report within a reasonable time after discovering such discrepancies or defects shall constitute an acknowledgment that the other construction or operations by County or Separate Contractor is suitable to receive the Work, except as to defects not then reasonable discoverable.

6.3 County's Right to Clean Up

If a dispute arises between Contractor and Separate Contractors as to the responsibility under their respective contracts for maintaining the Project site and surrounding areas free from waste materials and rubbish, County may clean up and allocate the cost between those firms it deems to be responsible

ARTICLE 7

CHANGES IN THE WORK

7.1 Changes

A. County may Order or authorize additions, deletions, and other changes in the Work by Change Order or Field Order without invalidating the Contract and without notice to sureties. Absence of such notice shall not relieve such sureties of any of their obligations to County. Upon receipt of any such document, Contractor shall promptly proceed with any changes in the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If County and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both that should be allowed as a result of a Work Change Directive, a Claim may be made therefore as provided in paragraph 4.3

7.2 Definitions

A. A Change Order is a Contract Document which has been signed by both County and Contractor, and states their agreement upon all of the following:

- A change in the Work, if any.
- The amount of an adjustment of the Contract Sum, if any.
- The amount of an adjustment of the Contract Time, if any.

B. A Directed Change Order may also be issued by the County without the Contractor's signature, where County determines that it is in County's best interest to allow Contractor to receive such an adjustment of the Contract Sum or Contract Time as County believes to be properly due Contractor, even though no agreement has been reached between County and Contractor.

C. A Field Order describes the scope or degree of a change in the Work which does not change the Contract Sum or Contract Time and the change described within the Field Order is agreed upon by County and Contractor.

7.3 Change Order Procedures

A. County and Contractor shall execute appropriate Change Orders(or Written Amendments) recommended by the County's Representative or Architect/ Engineer covering changes in the Work which are:

- (i) ordered by the County (ii) required because of acceptance of defective work, or County's correction of defective Work, or (iii) agreed to by the parties;
- changes in the Contract Price or Contract Times which are agreed to by the County and the Contractor, including any undisputed sums or amount of time for Work actually performed in accordance with a **Work Change Directive**; and
- changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by the County's Representative, or Architect/Engineer, provided that in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the progress schedule.

B. Execution of a Change Order by the County and the Contractor shall be considered complete and final compensation. It is expressly understood and agreed that the Contractor shall not be entitled to any additional compensation or time associated with an executed Change Order.

7.4 Work Change Directive

The Work Change Directive is a written directive to Contractor issued on or after the Effective Date of the Agreement and signed by County and recommended by Architect/Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times. Upon receipt of a Work Change Directive, the Contractor shall promptly proceed with the directed changes.

7.5 Unit Price Work

A. County has the right to increase or decrease the quantity of any Unit price item for which an estimated quantity is stated in the Bid Form.

B. County's Representative or Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. County's Representative will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon County and Contractor, subject to the provisions of paragraph 4.3.

7.6 Waiver

A waiver of or failure by County or County's Representative to enforce any requirement in this Article 7 will not constitute a waiver of, and will not preclude the County or County's Representative from enforcing, such requirements in connection with any other adjustments of the Contract Sum. The Contractor understands that no oral approval, either express or implied, of any adjustment of the Contract Sum by County or its agents shall be binding upon County unless and until such approval is ratified by execution of a written Change Order.

ARTICLE 8
CONTRACT TIME

8.1 Commencement of the Work

The date of commencement of the Work shall be set forth in the Notice To Proceed, and in no case shall the Contractor start Work later than 10 days within receipt of the Notice to Proceed. The date of commencement of the Work shall not be postponed by the failure of Contractor, Subcontractors, or of persons or firms for whom Contractor is responsible to act.

8.2 Progress and Completion

Time limits stated in the Contract Documents are of the essence of the Contract. By signing the Agreement Contractor represents to County that the Contract Time is reasonable for performing the Work and that Contractor is able to perform the Work within the Contract Time. Contractor shall not, except by agreement or instruction of County in writing, commence operations on the Project site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by Contractor. The dates of commencement and completion of the Work shall not be changed by the effective date of such insurance. Contractor shall proceed expeditiously with adequate forces and shall achieve full Completion of the Work within the Contract Time. If County's Representative determines and notifies Contractor that Contractor's progress is such that Contractor will not achieve full Completion of the Work within the Contract Time, Contractor shall immediately and at no additional cost to, County take all measures necessary, including working such overtime, additional shifts, Sundays, or holidays as may be required to ensure that the entire Project is completed within the Contract Time. Upon receipt of such notice from County's representative, Contractor shall immediately notify County's Representative of all measures to be taken to ensure full Completion of the Work within the Contract Time. Contractor shall reimburse County for any extra costs or expenses, including the reasonable value of any services provided by County's employees, incurred by County as the result of such measures.

8.3 Delay

Except and only to the extent provided otherwise in Articles 7 and 8, by signing the Agreement, Contractor agrees:

- to bear the risk of delays to completion of the Work; and
- that Contractor's bid for the Contract was made with full knowledge of this risk.

In agreeing to bear the risk of delays to completion of the Work, Contractor understands that, except and only to the extent provided otherwise in Articles 7 and 8, the occurrence of events that delay the Work shall not excuse Contractor from its obligation to achieve full completion of the Work within the Contract Time, and shall not entitle the Contractor to an adjustment of the Contract Sum.

8.4 Adjustment of Contract Time

The Contract Times may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the claim to the County's Representative and the other party to the Contract in accordance with the provisions of paragraph 4.3. Any adjustment of the Contract Times covered by a Change Order or of any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article.

8.5 Delays Beyond Contractor's Control

Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefore as provided in paragraph 4.3. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by County, acts or neglect of utility owners or other contractors performing Work as contemplated by Article 5 fires, floods, epidemics, abnormal weather conditions, or acts of God.

8.6 Delays Within Contractor's Control

The Contract Times will not be extended due to delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

8.7 Delays Beyond County's and Contractor's Control

Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond

the control of both County and Contractor an extension of the Contract Times in an amount equal to the time lost due to such delay shall be Contractor's sole and exclusive remedy for such delay.

8.8 Liquidated Damages

If the Contractor fails to substantially complete the Work by the specified completion date, the Contractor shall be liable for liquidated damages for each calendar date past the contract specified completion date. The date of substantial completion shall be determined by the County Engineer and his decision shall be final. The daily liquidated damage s rate shall be determined from the Schedule of Liquidated Damages provided within the South Carolina Department of transportation Standard Specifications for Highway Construction, Edition of 2007 unless otherwise specified in the Bid Documents.

8.9 Waiver

A. In no event shall County , County's Representative, or County's Architect/Engineer be liable to Contractor, any Subcontractor, and Supplier, or any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from:

- delays caused by or within the control of Contractor; or
- delays beyond the control of both County and Contractor including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God, or acts or neglect by utility owners or other contractors performing other work contemplated by Article 5.

B. Nothing in paragraph 8.9 bars a change in Contract Price pursuant to this Article 4.3 to compensate Contractor due to delay, interference, or disruption directly attributable to actions or inactions of County or anyone for whom County is responsible.

ARTICLE 9

PAYMENTS AND COMPLETION

9.1 Unit Price Work

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by County's Representative or Engineer subject to the provisions of paragraph 9.2.

B. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

C. County or Contractor may make a Claim for an adjustment in the Contract Price in accordance with paragraph 4.3 if:

- the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
- there is no corresponding adjustment with respect any other item of Work; and
- if Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Contractor believes that Contractor is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

9.2 Schedule of Values

Contractor shall provide a preliminary schedule of values for all of the Work which includes quantities and prices of items, when added together, equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. County's Representative will determine the actual quantities and classifications of Unit Price Work performed by Contractor. County's Representative will review with Contractor the County Representative's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). County Representative's written decision thereon will be final and binding (except as modified by County's Representative to reflect changed factual conditions or more accurate data) upon County and Contractor, subject to

the provisions of paragraph 4.3.

9.3 Progress Payments

County agrees to pay monthly to Contractor, subject to paragraph 9.5, an amount equal to 90% of the sum of the following:

- Cost of the Work in permanent place as of the end of the preceding month.
- Plus costs of materials stored on site but not yet incorporated in the Work.
- Less amounts previously paid.

9.4 Application for Payment

On or before such date of the month as is established by the County's Representative, Contractor shall submit to County's Representative monthly applications for payment, on a form as provided by the County, together with such supporting data, as County requires. Adjusted progress schedules shall be submitted with Applications for payment, and shall be required supporting documentation for the Application for Payment. For each Work item and monthly period, the actual percentages shall be tabulated for Work completed as of the date of the Application for Payment and estimated percentages shall be tabulated for remaining Work and months, if any. Percentages for Unit Price Work shall be calculated based upon the quantities given in the Bid Form, so that upon completion of such Work, or prior thereto, the total of the tabulated percentages for a work item may be greater or less than 100. County's Representative will review the application for payment and submit a Certificate for Payment to County. County will pay to Contractor 90% of the cost of the Work in permanent place and approved by County, less amounts previously paid, **within 20 days after County's Representative's receipt of the Application For Payment** and all required supporting data. The 10% retained by County will be paid to Contractor in the final payment.

9.5 Certificate for Payment

A. If Contractor has made application in accordance with paragraph 9.4, County's Representative shall, not later than 5 working days after the date of receipt of the Application for Payment, issue to County, with a copy to Contractor, a Certificate for Payment for such amount as County's Representative determines to be properly due.

B. Approval of any part of an Application For Payment may be withheld, a Certificate For Payment may be withheld, and all or part of a previous Certificate For Payment may be nullified and that amount withheld from a current Certificate For Payment on account of any of the following:

- Defective Work not remedied.
- Third-party claims against Contractor or County arising from the acts or omissions of Contractor or Subcontractors.
- Stop notices.
- Failure of Contractor to make timely payments due Subcontractors for material or labor.
- A reasonable doubt that the Work can be completed for the balance of the Contract Sum then unpaid.
- Damage to County or Separate Contractor for which Contractor is responsible.
- Reasonable evidence that the Work will not be completed within the Contract Time; and that the unpaid balance of the Contract Sum would not be adequate to cover County's damages for the anticipated delay.
- Failure of Contractor to maintain and update as-built documents.
- Failure of Contractor to submit schedules or their updates as required by the Contract Documents
- Performance of Work by Contractor without properly processed shop drawings.
- Liquidated damages assessed in accordance with Article 8 of the Agreement.
- Any other failure of Contractor to perform its obligations under the Contract Documents.

9.6 Retention

County shall deduct 10% from each Contractor payment as retainage. Retainage may be reduced at the County's discretion, to 5% upon 50% completion of the Work and/or upon recommendation of the Architect/Engineer. All remaining retainage to be paid upon satisfactory completion of all Work, as required by the Contract Documents.

9.7 Beneficial Occupation

County reserves the right, at its option and convenience, to make use of or otherwise occupy all or any part of the Work (Beneficial Occupancy) prior to completion of the Work and upon 10 days' notice to Contractor. Beneficial

Occupancy shall be subject to the following conditions:

A. County's Representative will make an inspection of the portion of the Project to be beneficially occupied and prepare a list of items to be completed or corrected prior to completion of the Contract.

Prior to Beneficial Occupancy, County will issue a certificate of beneficial occupancy on County's form.

- Beneficial Occupancy by County shall not be construed by Contractor as an acceptance by County of that portion of the Work which is to be occupied.
- Beneficial Occupancy by County shall not constitute a waiver of existing claims of County or Contractor against each other.
- Contractor shall provide, in the areas beneficially occupied and on a 24 hour and 7 day week basis as required, utility services, heating, and cooling for systems which are in operable condition at the time of Beneficial Occupancy. All responsibility for the operation and maintenance of equipment shall remain with Contractor while the equipment is so operated. Contractor shall submit to County an itemized list of each piece of equipment so operated with the date operation commences.
- The Warrantee Periods, as defined in paragraph 12.3, will commence upon the first date of actual occupancy or use of portions of the Work actually occupied and equipment or systems fully utilized.
- County shall pay all normal operating and maintenance costs resulting from its use of equipment in areas beneficially occupied.
- County shall pay all utility costs which arise out of the Beneficial Occupancy.
- Contractor shall not be responsible for providing security in areas beneficially occupied.
- County shall use its best efforts to prevent its Beneficial Occupancy from interfering with the conduct of Contractor's remaining Work.
- Contractor shall not be required to repair damage caused by County in its Beneficial Occupancy.
- Except as provided in this Article, there shall be no added cost to County due to Beneficial Occupancy.
- Contractor shall continue to maintain all insurance required by the Contract in full force and effect.

9.8 Substantial Completion

A. "Substantial Completion" means the stage in progress of the Work, as determined by the County's Representative, when the Work is complete and in accordance with the Contract Documents except only for completion of minor items which do not impair County's ability to occupy and fully utilize the Work for its intended purpose.

B. When Contractor gives notice to County's Representative that the Work is substantially complete, unless County's representative determines that the Work is not sufficiently complete to warrant an inspection to determine Substantial Completion, County's Representative will inspect the Work, and prepare and give to Contractor a comprehensive list of items to be completed or corrected before establishing Substantial Completion. Contractor shall proceed promptly to complete and correct items on the list. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. County's Representative will make an inspection to determine whether the Work is substantially complete. If County Representative's inspection discloses any item, whether or not included on the list, which must be completed or corrected before Substantial Completion, Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item. Contractor shall then submit a request for another inspection by County's Representative to determine Substantial Completion. Costs for additional inspection by County's Representative shall be deducted from any monies due and payable to Contractor. Neither tentative nor definitive certificates will be issued. However, the procedures set forth in the above paragraph may be used as a prelude to final acceptance.

C. When County's Representative determines that the Work is Substantially Complete, County's Representative will prepare a Certificate of Substantial Completion in County's format, which, when signed by County, shall establish the date of Substantial Completion and the responsibilities of the County and Contractor for security, maintenance, utilities, insurance, and damage to the Work. Unless otherwise provided in the Certificate of Substantial Completion, the Warrantee Period for the Work covered by the Certificate of Substantial Completion shall commence on the date of Final Payment for the Work. Substantial Completion shall not commence the Warrantee Period for any equipment or systems that:

- Are not fully operational (equipment or systems shall not be considered fully operational if they are intended to provide service to any portion of a building which the County has neither Beneficially

- Occupied nor accepted as Substantially Complete; or
- Are not accepted by the County.

The Warrantee Period for systems which become fully operational and accepted subsequent to Substantial Completion will begin on the date of their acceptance by the County.

9.9 Final Completion and Payment

A. Upon receipt of notice from the Contractor that the Work is ready for final inspection, County's Representative will make such inspection. Final Completion shall be when County's Representative determines that the Work is fully completed and in accordance with the Contract Documents. County will file a Notice of Completion within days after Final Completion. After receipt of the final Application For Payment, if County's Representative determines that Final Completion has occurred, County's Representative will issue the final Certificate For Payment.

B. Neither final payment nor any retention shall become due until Contractor submits the following items to County's Representative:

- The final Application For Payment and all submittals required in accordance with 9.4.
- All guarantees and warranties procured by Contractor from Subcontractors, all operating manuals for equipment installed in the project, as-built documents, and all other submittals required by the Contract Documents.

The final payment shall be made, subject to the satisfaction of all other conditions to final payment, within 35 days after the filing of the Notice of Completion.

C. Acceptance of final payment by Contractor shall constitute a waiver of all claims, except those previously made in writing and identified by Contractor as unsettled at the time of the final Application for Payment.

ARTICLE 10

PROTECTION OF PERSONS AND PROPERTY

10.1 Safety Precautions and Programs

Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

10.2 Safety of Persons and Property

Contractor shall take adequate precautions for safety of and shall provide adequate protection to prevent damage, injury, or loss to employees involved in the Work and other persons who may be affected thereby; the Work in place and materials and equipment to be incorporated therein, whether in storage on or off the Project site, under care, custody, or control of Contractor or Subcontractors; and, other property at the Project site and adjoining property. Contractor shall erect and maintain until the acceptance of the Work, as required by existing conditions and performance of the Work, adequate safeguards for safety and protection, including providing adequate lighting and ventilation, posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent sites and utilities. When use or storage of explosives, other hazardous materials, equipment, or unusual methods are necessary for execution of the Work Contractor shall exercise the utmost care and carry on such activities only under the supervision of properly qualified personnel. Contractor shall designate a responsible member of Contractor's organization at the Project site whose duty shall be prevention of accidents. That person shall be the Superintendent, unless otherwise designated by Contractor in writing to County and County's Representative. Contractor shall not load or permit any part of the Work or the Project site to be loaded so as to endanger the safety of persons or property.

10.3 Emergencies

In an emergency affecting the safety of persons or property, Contractor shall act to prevent or minimize injury, damage, or loss. Contractor shall promptly notify County's Representative, which notice may be oral followed by written confirmation, or the occurrence of such an emergency and Contractor's action.

ARTICLE 11

INSURANCE AND BONDS

11.1 Contractors Insurance

A Contractor shall purchase and maintain until final payment property insurance upon the Work at the site. This insurance shall include the interest of the County, Contractor, Subcontractors, Engineer and Engineer's Consultants in the Work (all of whom shall be listed as insureds or additional insured parties), shall insure against the perils of fire and extended coverage, shall include "at risk" insurance for physical loss and damages including theft, vandalism, and malicious mischief, and shall include damages, losses and expenses arising out of or resulting from any insured loss incurred in the repair or replacement of any insured property (included but not limited to fees and charges of engineers, architects, attorneys and other professionals). All of the policies of insurance (and certificates or other evidence of insurance) required to be purchased by the Contractor will contain a provision that the coverage provided will not be materially changed, cancelled, or renewal refused until at least thirty (30) days prior written notice has been given to the County and Contractor and to each other party to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with paragraph 11.3.

B Contractor shall purchase and maintain insurance coverage as required within the Schedule of Insurance Requirements of Exhibit GR-A, attached hereto and made part thereof.

C If required in the Schedule of Insurance Requirements of Exhibit GR-A in Part II of the General Requirements of the Specifications, attached hereto and made a part thereof, Contractor shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws or Regulations which will include the interests of the County, Contractor, Subcontractors, Engineer, Engineer's Consultants, and any other individuals or entities identified in the Supplemental Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

D If the Work requires entry on any railroad right-of-way, insurance coverage and amount of coverage shall be provided in accordance with the requirements of the railroad.

11.2 Insurance Certificates

Before any Work at the site is authorized, Contractor shall deliver to the County Engineer, in triplicate, certificates as evidence of insurance which Contractor is required to purchase and maintain in accordance with the Schedule of Insurance Requirements. The certificates delivered by Contractor shall contain for each insurance policy required the following information: policy number, effective date, names and addresses of insureds, type of coverage, limits of liability, location of operations to which insurance applies, and expiration date. In addition, the certificates shall refer to these Contract Documents and state that the policy or policies provide the coverage and the amount of coverage required by the Contract Documents. Further, the certificates shall state that thirty days prior written notice shall be given to County of cancellation or material change in the policy. If County has any objection to the coverage afforded by or other provisions of the insurance required to be purchased and maintained by Contractor on the basis of its not complying with the Contract Documents, County shall notify Contractor in writing thereof. Contractor shall provide such additional information in respect of information as County may reasonably request, before any Work at the Site is authorized.

11.3 Waiver of Rights

A County and Contractor intend that all policies purchased in accordance with paragraph 11.1 will protect County, Contractor, Subcontractors, Engineer, Engineer's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. County and Contractor waive all rights against each other and their respective officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them for all losses and

damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, Engineer, Engineer's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by County as trustee or otherwise payable under any policy so issued.

B. County waives all rights against Contractor, Subcontractor, Engineer, Engineer's Consultants, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and of them for:

- loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to County's property or the Work caused by, arising out of, or resulting from fire or other peril whether or not insured by County; and
- loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by County during partial utilization pursuant to paragraph 9.7, after Substantial Completion pursuant to paragraph 9.8, or after final payment pursuant to paragraph 9.9.

11.4 Receipt and Application of Insurance Proceeds

A. Any insured loss under the policies of insurance required by paragraph 11.2 will be adjusted with County and made payable to County as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of paragraph 11.3B. County shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement among the parties in interest is reached, the damaged Work shall be repaired or replaced, the money's so received on account thereof, and the Work and the cost thereof covered by an appropriate Change Order or Written Amendment.

B. County as fiduciary shall power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to County's exercise of this power. If no such objection is made, County, as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, County as fiduciary shall give bond for the proper performance of such duties.

11.5 Performance Bond and Labor/Material Bond

Contractor shall furnish separate Performance and Payment Bonds, each in an amount equal to 100 percent of the Contract Price, on forms included in the Contract Documents as exhibits to the Agreement. The penal sum of each such bond shall be issued by a surety company licensed to do business in South Carolina and listed by the Department of Treasury (also known as a "T" listed surety) with an "A" minimum rating in performance, as stated in the most current publication of Best's Key Rating Guide. Each bond shall be accompanied by a power of attorney, authorizing the attorney in fact to bind the surety certified, in include the date of the bond. The bond shall be dated on or after the date of the contract. The Contractor shall have a maximum of 21 days from the date of notice of intent to award to deliver the performance and payment bonds, certificates of insurance, and the contract to the Owner. Failure to deliver these documents as required shall entitle the Owner to consider the bid unresponsive and declare the bid security forfeited.

ARTICLE 12

UNCOVERING AND CORRECTION OF WORK

12.1 Uncovering of Work

A. If a portion of the Work is covered contrary to County Representative's request or direction, or contrary to the requirements of the Contract Documents, it must, if required in writing by the County's Representative, be uncovered for County Representative's observation and be replaced at Contractor's expense without adjustment

of the Contract Time or the Contract Sum.

B. If a portion of the Work has been covered, which is not required by the Contract Documents to be observed or inspected prior to its being covered and which County's Representative has not specifically requested to observe prior to its being covered, County's Representative may request to see such Work and it shall be uncovered and replaced by the Contractor. If such Work is in accordance with the Contract Documents, the costs of uncovering the Work and replacing the Work shall be added to the contract sum by Change Order; and if the uncovering and replacing the Work extends the Contract Time, an appropriate adjustment of the Contract Time shall be made by Change Order. If such Work is not in accordance with the Contract Documents, Contractor shall pay such costs and shall not be entitled to an adjustment of the Contract Time or Contract Sum.

12.2 Correction of Defective Work

Contractor shall (1) correct Defective Work that becomes apparent during the progress of the Work or during the Warrantee Period and (2) replace, repair, or restore to County's satisfaction any parts of the Work and any other real or personal property which is damaged or destroyed as a result of Defective Work or the correction of Defective Work. Contractor shall promptly commence such correction, replacement, repair, or restoration upon notice from County's Representative or County, but in no case later than 10 days after receipt of such notice; and Contractor shall diligently and continuously prosecute such correction to completion. Contractor shall bear all costs of such correction, replacement, repair, or restoration, and all Losses resulting from such Defective Work, including additional testing, inspection, and compensation for County's Representatives services and expenses. Contractor shall perform corrective Work at such times that are acceptable to County and in such a manner as to avoid, to the extent practicable, disruption to County's activities.

12.3 Warrantee Period

The Contractor and his Surety shall unconditionally warrant and guarantee all workmanship and materials of the entire Contract to be and remain free of defects for a period of one year from the date of Final Payment.

12.4 Warrantee Inspection

The Contractor (or General Contractor and requested subcontractors) shall attend a warrantee inspection during the year following project completion. The inspection will be scheduled by the County for a date approximately nine months after the date of the Certificate of Substantial Completion. The Contractor shall take immediate action to remedy all warranty items identified during the inspection.

ARTICLE 13

TERMINATION OR SUSPENSION OF THE CONTRACT

13.1 Suspension of Work

At any time and without cause, County may suspend the Work or any portion thereof by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be allowed an extension of the Contract Times equal to the duration of the suspension of the Work.

13.2 Termination for Cause

- A. The occurrence of any one or more of the following events will justify termination for cause:
- Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established under paragraph 3.9 as adjusted from time to time pursuant to paragraph 8.4);
 - Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
 - Contractor's disregard of the authority of ENGINEER; or
 - Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in paragraph 13.2.A occur, County may, after giving Contractor (and the surety, if any) seven days written notice, terminate the services of Contractor, exclude Contractor from the

Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without Liability to Contractor for trespass or conversion), incorporate in the Work all materials and equipment stored at the Site or for which County has paid Contractor but which are stored elsewhere, and finish the Work as County may deem expedient. In such case, Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by County arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to County. Such claims, costs, losses, and damages incurred by County will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph.

C. Where Contractor's services have been so terminated by County, the termination will not affect any rights or remedies of County against Contractor then existing or which thereafter accrue. Any retention or payment of monies due Contractor by County will not release Contractor from liability.

13.3 Termination for Convenience

A. Upon seven days written notice to Contractor and Engineer, County may, without cause and without prejudice to any other right or remedy of County, elect to terminate the Contract. In such case, Contractor shall be paid (without duplication of any items):

- for completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work; for expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; for all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others.
- for reasonable expenses directly attributable to termination.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

ARTICLE 14 MISCELLANEOUS PROVISIONS

14.1 Governing Law

The Contract shall be governed by the laws of the State of South Carolina.

14.2 Successors and Assigns

County and Contractor respectively bind themselves and their successors, permitted assigns, and legal representatives to the other party and to the successors, permitted assigns, and legal representative as of such other partying respect to covenants, agreements, and obligations contained in the Contract Documents. Neither party to the Contract shall assign the Contract, in whole or in part, without prior written consent of the other party. Notwithstanding any such reassignment, each of the original contracting parties shall remain legally responsible for all its obligations under the Contract.

14.3 Rights and Remedies

All rights and remedies of County under the Contract are cumulative with all other rights and remedies of County under the Contract or at law or in equity. No act or failure to act by County or County's Representative shall constitute a waiver of a right under the Contract, or approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing. No waiver by County or County's Representative of any breach or default shall constitute a waiver of any other breach or default nor constitute a continuing waiver. No provision contained in the Contract Documents shall create or give third parties any claims or right of action against County, County's Representative, or Contractor.

14.4 Survival

The provisions of the Contract which by their nature survive termination of the Contract or Final Completion, including all warranties, indemnities, and payment obligations, shall remain in full force and effect after Final Completion or any termination of the Contract.

14.5 Complete Agreement

The Contract Documents constitute the full and complete understanding of the parties and supersede and previous agreements or understandings, oral or written, with respect to the subject matter hereof. The Contract may be modified only by a written instrument signed by both parties or as provided in Article 7.

14.6 Severability of Provisions

If any one or more of the provisions contained in the Contract Documents should be invalid, illegal, or unenforceable in any respect, the validity, legality, and enforceability of the remaining provisions contained herein shall not in any way be affected or impaired thereby.

14.7 Notices

All notices, demands, and other communications given under the Contract shall be in writing addressed to the respective parties at the addresses set forth in the Contract Documents, and shall be deemed given upon actual receipt or, in the case of registered or certified mail, on the date shown on the return receipt when delivery during normal business hours was made or attempted. Addresses may be changed by notice given in accordance with this provision.

14.8 Patents and Royalties

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of County or Architect/Engineer its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by County in the Contract Documents. County or Architect/Engineer have no actual knowledge of any license fee or royalty due on any material or equipment specified in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless County, County's officers, agents, employees, Architect/Engineer, Architect's/Engineer's consultants, and the officers, directors, partners, employees or agents, and other consultants of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents. If the Contractor uses any design, device or materials covered by letters, patent or copyright, he shall provide for such use by suitable agreement with the owner of such patented or copyrighted design, device or material. It is mutually agreed and understood, that without exception, the Contract Sum shall include all royalties or costs arising from and the use of such design device or materials, in any way involved in the Work.

ARTICLE 15

STATUTORY LANGUAGE REQUIREMENTS

15.1 Scope

The paragraphs under this article 15 contain language mandatory for public contracts under the laws of the State of South Carolina. Nothing in these paragraphs shall be construed to relieve Contractor of responsibility, to comply with all Laws and Regulations as set forth in the Contract Documents.

15.2 Affirmative Action

During the performance of this Contract, the Contractor agrees as follows:

The contractor or subcontractor, where applicable, will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status or sex. The contractor will take affirmative action to ensure that such applicants are recruited and employed, and that employees are treated during employment, without regard to their age, race, creed, color, national origin, ancestry, marital status or sex. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places available to employees and applicants for employment, notices to be provided by the Public Agency Compliance Officer setting forth revisions of this nondiscrimination clause. The contractor or subcontractor, where applicable will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to age, race, creed, color, national origin, ancestry, marital status or sex.

GENERAL PROVISIONS

The General Provisions of the Contract shall be as listed in the South Carolina State Highway Division, Standard Specifications for Highway Construction, Edition of 2007, Section 100 General Provisions, Sections 101 - 109.10 inclusive, except as noted & amended elsewhere herein.

(Balance of Page Intentionally Left Blank)

SCHEDULE OF INSURANCE REQUIREMENTS

1. **INSURANCE REQUIREMENTS**: Prior to commencing work/delivery hereunder, contractor/vendor, at his expense, shall furnish insurance certification showing the certificate holder as Beaufort County, P. O. Drawer 1228, Beaufort, SC 29901, Attention: Risk Management Director, and with a special notation naming Beaufort County as an additional insured on the liability coverages. Minimum coverage shall be as follows:

- 1.4 **Worker's Compensation Insurance** – Contractor shall have and maintain, during the life of this contract, Worker's Compensation Insurance for his or her employees connected to the work/delivery, in accordance with the Statutes of the State of South Carolina and any applicable laws. Employers Liability minimum limits required \$500,000
- 1.5 **Commercial General Liability Insurance** - Contractor shall have and maintain, during the life of this contract, Commercial General Liability Insurance. Said Commercial General Liability Policy shall contain Contractual Liability and Products/Completed Operations Liability subject to the following minimum limits: \$1,000,000 Each Occurrence/ \$2,000,000 General Aggregate and \$2,000,000 Products/Completed Operations Aggregate naming Beaufort County as an additional insured.
- 1.6 **Comprehensive Automobile Liability Insurance** – The Contractor shall have and maintain, during the life of this contract, Comprehensive Automobile Liability, including non-owned and hired vehicles, of at least \$1,000,000 COMBINED SINGLE LIMIT.

1.3.1 **ADDITIONAL INSURANCE REQUIREMENTS**: Umbrella Liability Insurance – Contractor shall have and maintain, during the life of this contract, Umbrella Liability Insurance with a minimum limit of \$2,000,000

1.3.2: Professional Liability (Errors & Omissions): Professional Liability Insurance protects against losses that occur when a “professional” errors in judgement, planning, and design could result in economic loss to the entity or county. In order to determine if Professional Liability should be required ask yourself: Is the professional licensed or certified (i.e. architects, consultants, auditors, attorneys, engineers, etc.)? Required if a contractor is performing any type of design/build for a particular project.

The vendor shall maintain a limit no less than \$1,000,000 per occurrence:

- 1.4 The required insurance policy at the time of issue must be written by a company licensed to do business in the State of South Carolina and be acceptable to the County.
- 1.5 The Contractor/vendor shall not cause any insurance to be canceled or permit any insurance to lapse. All insurance policies shall contain a clause to the effect that the policy shall not be canceled or reduced, restricted or limited, until fifteen (15) days after the County has received written notice, as evidenced by return receipt of registered or certified letter. Certificates of Insurance shall contain transcript from the proper office of the insurer, the location, and the operations to which the insurance applies, the expiration date, and the above-mentioned notice of cancellation clause.
- 1.6 The information described above sets forth minimum amounts and coverages and is not to be construed in any way as a limitation on the Contractor's liability.

SPECIAL PROVISIONS

Beaufort County DNA Laboratory Addition

1. **The ENGINEER shall verify the amount of work completed on the above referenced projects with the CONTRACTOR before Progress Payments are issued.**
2. **There shall be no pre-qualifications of the Bidders.**
3. **Progress and Shop Drawing Schedules**

Before starting construction the **CONTRACTOR** shall be required to submit a base line project schedule and shop drawings as follows:

- A. Before commencement of work the **CONTRACTOR** shall submit either a computerized schedule in an approved tracking format of the work necessary to complete the project to the **ENGINEER** for review at the time of the preconstruction meeting **OR** a complete construction narrative describing all elements the work including durations and resources necessary for the successful and timely completion of the project. The computerized software if used will be Microsoft Project, SureTrac/Primavera or equal. The schedule shall be a form approved by the **ENGINEER** indicating the estimated start time and end dates of each major item or phase of the work.
 - B. Monthly progress schedule updates are required and may be a bar chart of type acceptable to the **ENGINEER** as to form and substance or a narrative. All costs for furnishing and updating the progress schedule shall be included in the price bid for the various Pay Items scheduled in the Bid Document.
 - C. The **CONTRACTOR** shall also submit to the **ENGINEER** a schedule of Shop Drawing submissions for all fabricated materials which are to be incorporated into permanent construction and which are not furnished by the County. Such Detail drawings shall become property of the County.
 - D. Failure to provide timely updates and shop drawings may result in the withholding of progress payments.
4. **Progress and Job-Site Meetings**
 - A. A **mandatory** Construction Progress Meeting attended by the **CONTRACTOR** and **ENGINEER** will be conducted two weeks after the Notice To Proceed has been issued to the **CONTRACTOR**, followed by **semi-monthly (twice a month)** progress meetings. The meeting time and place will be determined at the Preconstruction meeting prior to the start of construction.

5. **Survey and Stakeouts**

- A. The **CONTRACTOR** shall do all surveying and stakeout work required to construct all elements of the Project as stated in the **Supplemental Conditions, Section 104** of the Contract Documents. The **CONTRACTOR** is responsible for the accuracy of all survey and stakeout work including verification of existing reference points. The **CONTRACTOR** shall furnish any copies of survey notes requested by the **ENGINEER**. This work shall include finish grade and offset stakes, to be set throughout the project and shall be provided by the **CONTRACTOR's** Land Surveyor.

6. **Supervision and Superintendence**

The work and the work site shall be under the direct charge and direction of the **CONTRACTOR**. The **CONTRACTOR** shall give sufficient superintendence to the Work, using the best skill and attention. The **CONTRACTOR** shall at all times keep on the site, during its progress, a necessary Forepersons and Assistants, all satisfactory to the **ENGINEER**. The Superintendent shall represent and have full authority to act for the **CONTRACTOR** in the latter's absence, and the directions given to the Superintendent shall be as binding as though given to the **CONTRACTOR**. The same shall apply to the Forepersons during the absence of both the **CONTRACTOR** and the Superintendent. The Superintendent shall not be changed during the performance of the Work covered by the Contract Documents except with written consent of the **ENGINEER** unless the Superintendent proves to be unsatisfactory to the **CONTRACTOR** and ceases to be in its employ.

- A. Should the **ENGINEER**, at any time, give notice in writing to the **CONTRACTOR** or its representative on the Work that any employee is insolent, disorderly, careless, unobservant of the instructions, dishonest, or in any way a detriment to the satisfactory progress of the Work, such employee shall at once be removed from the Project and not again be allowed to engage in any part of the Work.
- B. The **CONTRACTOR** shall be required to organize, manage, and supervise its own work and to coordinate the work of its subcontractors. On all multi-contract projects, all prime contractors shall be required to organize, manage, and supervise their own work. On all multi-contract projects, all prime contractors shall cooperate with the County and other prime contractors in the overall coordination and supervision of the project.

7. **Construction Notes**

- A. **CONTRACTOR** to contract all utility companies before any work commences. Verify utilities within project area.
- B. All work shall conform to the applicable Federal, State, and Local requirements and codes.
- C. Temporary control of storm water drainage shall be the responsibility of the general contractor, and shall be maintained throughout the period of the construction.

- D. All traffic control devices shall be in accordance with the Manual on Uniform Traffic Control Devices for Streets and Highways, Edition 2009 & current SCDOT Standard Drawings for Work Zone Traffic Control Requirements.
- E. In the event of a conflict with a sewer, water, drainage, or other utility lines or services, the **CONTRACTOR** shall coordinate with the affected utility and the **ENGINEER** and shall field adjust as directed.
- F. Any utilities that are damaged and are not to be removed shall be paid for or replaced at the **CONTRACTOR'S** expense.
- G. Location, existence, or non-existence of any utility does not constitute responsibility of the **ENGINEER**.
- H. The location of any shown utilities is approximate.
- I. All watercourse ditch excavation quantities will be monitored by the **ENGINEER**.

EXHIBIT 1

Required Documents


THIS IS NOT AN ORDER

ORIGINAL

*VENDOR

*VENDOR COPY

Dates Advertised: **April 29, 2020**

	<p>(IFB)</p>	<p>FORMAL SEALED BID (X) REQUEST FOR QUOTE ()</p> <p>We require bids to be electronically submitted through our Vendor Registry Program. Please go to www.BeaufortCountySC.gov and sign up to submit your bid. If you do not have access to a computer, you may hand deliver your bid.</p>	
		<p>BIDS WILL BE RECEIVED UNTIL 3:00 P.M.</p>	<p>Bid No.</p>
<p>LOCAL TIME ON:</p> <p style="text-align: center;">May 29, 2020</p>	<p>IFB #052920E</p>		
<p>BID TITLE: Beaufort County DNA Laboratory Addition</p>			
<p>PREBID CONFERENCE: A Pre-Bid conference will be held on May 12, 2020. 2:00pm, in the Finance Conference Room located at 106 Industrial Village Road, Building 2, Beaufort, SC 29906. Bidders are responsible for their own transportation. All interested bidders must attend the meeting.</p>			
<p>David L. Thomas, CPPO Purchasing Director</p>	<p>Mailing Date</p>	<p>E-MAIL QUESTIONS TO: Dave Thomas – dthomas@bcgov.net at least calendar 10 days before bid opening.</p>	
<p>VENDOR NAME</p>	<p>REASON FOR NO BID</p>		
<p>VENDOR MAILING ADDRESS</p>	<p>Amend Number(s) Received:</p>		
<p>CITY-STATE-ZIP-CODE</p>	<p>S.C. TAX NO.</p>		
<p>Telephone Number ()</p>	<p>FEDERAL I.D. OR SOCIAL SECURITY NO.</p>		
<p>Toll-Free Number ()</p>			
<p>Fax Number ()</p>			
<p>I certify that this bid is made without prior understanding, agreement, or connection with any corporation, firm or any corporation, firm, or person submitting a bid for the same materials, supplies, or equipment, and is in all respects fair and without collusion or fraud. I agree to abide by all conditions of this bid and certify that I am authorized to sign this bid for the bidder.</p>	<p><u>AUTHORIZED SIGNATURE (MANUAL)</u></p>		
	<p><u>AUTHORIZED SIGNATURE (TYPE/TITLE)</u></p>		
<p>Bid Security is attached (if required) in the amount of: 5% of Bid if over \$30,000.00.</p>			

BID ACCEPTANCE AND DELIVERY (Prices bid must be firm for a minimum of 90 days). In compliance with the Invitation, and subject to all conditions thereof, the above signed offers and agrees, if this bid is accepted within ___ days from date of opening, to furnish any or all items quoted on at prices as set forth after the item and to make delivery within ___ days after receipt of order with transportation cost included and prepaid. Unless otherwise stated and accepted herein, I agree to complete this proposed contract in less than sixty (60) days after issue date of purchase order.

IMPORTANT

IF YOU CONSIDER THESE SPECIFICATIONS AS RESTRICTIVE,
SEE GENERAL PROVISIONS, PARAGRAPH #20, DISCREPANCIES.

* Bids received after the time specified for opening cannot be considered.

BID FORM

PRICES INDICATED HEREIN REFLECT STRICT COMPLIANCE WITH TERMS, CONDITIONS, PROVISIONS AND SPECIFICATIONS OF THIS INVITATION FOR BID, OR WITH EXCEPTION DETAILED IN AN ENCLOSURE APPENDED HERETO.

SINGLE PRIME CONTRACT

**Beaufort County Engineering
Beaufort County DNA Laboratory Addition
IFB NUMBER: 052920E**

PREPARED BY:

Beaufort Design Build, LLC
2 Fire Station Lane
Seabrook, South Carolina 29940
843-466-3664

BID DATE: Friday, May 29, 2020

TO:

Beaufort County Purchasing Department
106 Industrial Village Road, Building 2
Beaufort, South Carolina 29906-4291

FROM:

Name of Bidder _____

The undersigned Bidder hereby declares that his Proposal is made without connection with any other person, company, or parties making a similar bid or proposal, and that it is in all respect fair and in good faith, without collusion or fraud. It is the Bidder’s intention & purpose to enter into a Contract with Beaufort County. The Bidder signifies that his bid is all-inclusive to perform the Work to construct the **Beaufort County Engineering, Beaufort County DNA Laboratory Addition** project as illustrated in the Contract Documents prepared by Beaufort Design Build, LLC dated April 29, 2020. The Bidder has carefully examined the Contract Documents and Proposal Form and is familiar with the scope, details, intent, and conditions under which the Work, or any part of it, is to be executed, and the conditions which must be fulfilled in the furnishing and/or erection or construction of any or all items of the Work. The Bidder hereby proposes to furnish all labor, materials, equipment and services necessary to perform the Work required in the Drawings, Project Manual (specifications) and the terms of this Proposal for the amounts listed below.

A. Total Bid for Base Contract: \$ _____

B. Total Bid for Alternate: \$ _____

UNIT PRICES: There are no unit prices.

OWNER PREFORMED WORK: None

The Bidder further agrees to begin the work promptly upon receipt of a written Notice to Proceed and to pursue the work with an adequate work force to complete the work within **One Hundred and eighty (180) Calendar Days** from the Notice to Proceed. **Five Hundred Dollars (\$500.00)** per calendar day is hereby agreed upon as the Liquidated Damages.

The Bidder acknowledges receipt of the following addenda:

Addendum No. _____	Dated _____	Addendum No. _____	Dated _____
Addendum No. _____	Dated _____	Addendum No. _____	Dated _____
Addendum No. _____	Dated _____	Addendum No. _____	Dated _____
Addendum No. _____	Dated _____	Addendum No. _____	Dated _____
Addendum No. _____	Dated _____	Addendum No. _____	Dated _____

The Bidder has enclosed the following with this Proposal:

- _____ Invitation for Bid
- _____ Bid Form
- _____ Schedule of Prices
- _____ Bid Bond, cashier’s check or certified check in the amount of five percent (5%) of the Total Bid (line C above)
- _____ Consent of Surety
- _____ Certification by Contractor Regarding Non-Segregated Facilities
- _____ No-Collusion Affidavit
- _____ Contractors Qualifications Statement
- _____ Local Vender Preferences
- _____ Small and Minority Business Self-Performance Affidavit
- _____ Self-Performance Affidavit
- _____ Good Faith Efforts Checklist
- _____ Non-Discrimination Statement

The undersigned certifies that this Bid does not violate any Federal or State Antitrust Laws.

BID SURETY IS REQUIRED ON BIDS OVER \$30,000.00 IN THE FORM OF A BID BOND, CASHIER’S CHECK OR CERTIFIED CHECK IN AN AMOUNT OF 5% OF THE BID AMOUNT, PAYABLE TO THE BEAUFORT COUNTY TREASURER.

I, the undersigned, certify that this bid does not violate any Federal or State Antitrust Laws.
Bidders Federal Social Security Identification (E.I.) No. _____

(Company Name)

(Mailing Address)

(Street Address)

(CITY/STATE/ZIP)

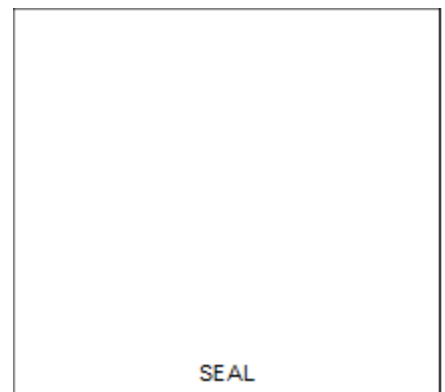
BY _____ TITLE _____
(Please print)

(Signature – Bids Must Be Signed)

TELEPHONE _____ DATE _____

FAX #: _____

EMAIL ADDRESS: _____



DNA LABORATORY ADDITION

BID#	IFB# 052920E	
OWNER	BEAUFORT COUNTY	
BIDDER		
BIDDER SC LICENSE NUMBER		
DATE		
PROJECT BID	\$	
PROPOSED BID		
DESCRIPTION OF WORK	BASE BID	ALTERNATE BID
1. General Conditions		
2. Bonds and insurance		
3. Surveying and record drawings		
4. Mobilization/Demobilization		
5. Engineering/Design		
6. Construction entrance/laydown		
7. Tree Protection		
8. Grading/Excavation		
9. Concrete		
10. Masonry		
11. Wood Framing		
12. Finish Carpentry		
13. Doors, Windows, Hardware		
14. Roofing		
15. Insulation		
16. Siding/Trim		
17. Gypsum board and installation		
18. Flooring		
19. Painting		
20. Millwork		
21. Mechanical		
22. Electrical		
23. Plumbing		
24. Asphalt/Paving		
25. Landscaping		
26. Other (specify)		
BIDS		

IFB # _____

BID BOND

(Five Percent [5%] of Bid)

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned:
_____, as Principal, and

_____, as Surety, are hereby held and firmly bound unto Beaufort County,
South Carolina as County in the penal sum of _____

_____ Dollars

(\$_____) for the payment of which, well and truly to be made, we
hereby jointly and severally bid ourselves, our heirs, executors, administrators, successors, and assigns.
Signed this _____ day of _____, 20_____.

The condition of the above obligation is such that whereas the Principal has submitted to Beaufort
County, South Carolina a certain bid attached hereto and hereby made a part hereof to enter into a contract
in writing for the construction of:

NOW, THEREFORE,

- a) If said bid shall be rejected or in the alternate.
- b) If said bid shall be accepted and the Principal shall execute and deliver a Contract in the
Form of Contract attached hereto (properly complete in accordance with said bid) and shall
furnish a bond for his faithful performance of said Contract and for the payment of all
persons performing labor and furnishing material in connection therewith, and shall in all
other respects perform the agreement created by the acceptance of said bid, then this
obligation shall be void, otherwise the same shall remain in force and effect, it being
expressly understood and agreed that the liability of the surety for any and all claims
hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its
bond shall be in no way impaired or affected by any extension of the time within which the County may
accept such bids, and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____(SEAL)
Principal

By:_____

_____(SEAL)

Surety:_____

By:_____

South Carolina Representative

IFB # _____

CONSENT OF SURETY

OWNER: _____

TITLE OF WORK: _____
(Complete above exactly as given in Invitation to Bid)

In consideration of the premises and of One Dollar (**\$1.00**), lawful money of the United States, it is in hand paid by the Contractor, the receipt whereof, is hereby acknowledged, the undersigned surety consents and agrees that if the contract, for which the preceding Bid is made, be awarded to the person or persons submitting the same as contracted, it will become bound as surety and guarantor for its faithful performance in an amount equal to one hundred percent (**100%**) of the Contract Price, and will execute as surety thereto when required to do so by the Owner, and if the said Contractor shall omit or refuse to execute such contract, if so awarded, it will pay without proof of notice and on demand to the Owner any increase between the sum of which the said Contractor would have been entitled upon the completion of the said Contract and the sum which the said Owner may be obligated to pay to another contractor to whom the contract may be afterwards awarded, the amount in such case to be determined by the bids plus the cost, if any, of re-advertising for bids for this work, less the amount of any certified check or bid bond payable and received.

In witness whereof, said surety has caused these presents to be signed and attested by a duly authorized officer and its corporate seal to be hereto affixed this _____ day of _____, 20____.

(A corporate acknowledgment and statement of authority to be here attached by the surety company).

(Surety Company)

BY: _____
(Surety Company, Attorney-In-Fact)

Attest: _____

IFB # _____

CERTIFICATION BY CONTRACTOR

Regarding

NON-SEGREGATED FACILITIES

The Bidder certifies that he does not, and will not, provide and maintain segregated facilities for his employees at his establishments and, further that he does not, and will not, permit his employees to perform their services at those locations, under his control, where segregated facilities are provided and maintained. Segregated fountains, transportation, parking, entertainment, recreation, and housing facilities; waiting, rest, wash, dressing, and locker room, and time clock, work, storage, restaurant, and other eating areas which are set apart in fact, or by explicit directive, habit, local custom, or otherwise, on the basis of color, creed, national origin, and race. The Bidder agrees that, except where he has obtained identical certifications from proposed subcontractors for specific time periods, he will obtain identical certifications from proposed subcontractors prior to the award of subcontractors exceeding **\$10,000.00** which are not exempt from the provisions of the Equal Opportunity clause, and that he will retain such certifications in his files.

The Bidder agrees that a breach of this certification is a violation of the Equal Opportunity clause in this Contract. The penalty for making false statements is prescribed in 18 U.S.C. 1001.

Contractor

(Signature)

Name and Title of Signer

Date

IFB # _____

NON-COLLUSION AFFIDAVIT OF PRIME BIDDER

State of _____)

) ss.

County of _____)

Being first duly sworn,

deposes and says that:

He is _____ (Owner, Partner, Officer, Representative, or Agent) of the Bidder that has submitted the attached Bid;

(1) He is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;

(2) Such Bid is genuine and is not a collusive or sham Bid;

(3) Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees, or parties in interest, including this affiant, has in any way colluded, conspired, connived, or agreed, directly or indirectly, with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted to or refrain from bidding in connection with such Contract, or has in any collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in the attached Bid or of another Bidder, or to fix any overhead, profit or cost element of the bid price or the Bid of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against Beaufort County or any person interested in the proposed Contract; and,

(4) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance, or unlawful agreement on the part of the Bidder or any of its agents, representative, owners, employees, or parties in interest, including this affiant.

Name

Title

Subscribed and sworn to before me this

_____ Day of _____, 20_____.

_____ (SEAL)

_____ Title

My commission expires: _____

IFB # _____

CONTRACTOR'S QUALIFICATION STATEMENT

CERTIFICATION: The following is a statement of fact.

Signature	Typed Name and Title	Date
-----------	----------------------	------

A. GENERAL

A.1 Submit to: _____

A.2 Name of Project (if applicable): [Project Title] _____
[Project Location] _____

A.3 Contractor:

A.4 Name: _____

Mailing Address: _____

Street Address: _____

Telephone Number (including area code): _____

Facsimile Number (including area code): _____

Contact Person: _____

Contact Person's Telephone Number: _____

South Carolina Contractor's License Number: _____

B. BUSINESS ORGANIZATION

B.1 Check type of business organization:

Corporation _____ Individual _____ Partnership _____

(Name of Partners) _____

Joint Venture _____ Other _____

B.2 If a corporation: _____

State of Incorporation: _____

If not incorporated in South Carolina, State Corporation Commission Registration Number: _____

Date of Incorporation: _____

Federal I.D. Number: _____

Name Address Phone No. Yrs. in Position

Officers:

President:

Vice President(s):

Secretary:

Treasurer:

Are you a Subchapter S Corporation: Yes No

Name Address Phone No.

Subchapter S Shareholders:

B.3 If a partnership:

Date of Organization:

Type of partnership:

List of General Partners:

Name Address & Phone No.

Years as GP

B.4 If individually owned:

Name, address, and phone number of sole-proprietor:

Years in business:

B.5 Have you ever operated under another name? Yes No

If yes,

All other business names and addresses of principal placed of business for each business.

Number of years in business under each name:

Contractor's license number in each state in which a business was operated.

C. BONDING

C.1 Bonding Agent:

Name: _____

Address: _____

Telephone Number (including area code): _____

Contact Person: _____

C.2 Bonding Company: _____

Name: _____

Address: _____

Telephone Number (including area code): _____

Contact Person: _____

Best's Key Rating of bonding company: _____

C.3 Number of years this bonding company has acted as surety for you:

C.4 Bonding Capacity: Maximum single job size: _____
Total bonding limit: _____

C.5 Do you intend to use any alternative form of security? _____
If so, indicate the form of security you intend to use and the name, address, point of contact, and telephone number of the banks, savings and loan, or surety you intend to use. (NOTE: Prequalification will not assure acceptance of any form of security.)

Form of Security: _____

Bank or Savings & Loan: _____

Contact: _____

Address & Phone No.: _____

C.6 Have any Performance or Payment Bond claims ever been paid by any surety on behalf of your organization?

Yes _____ No _____

If yes, state the name of the project(s); the date; the name, address, telephone number, and contact person for the claimant; the surety satisfying the claim; the size of the claim; and the circumstances giving rise to the claim. (Provide attachments if necessary.)

C.7 Have you ever arbitrated or litigated a claim with an Owner, Architect, or Engineer in the last five years?

Yes _____ No _____

If yes, state the name of the project(s); the date; the name, address, telephone number, and contact person for the claimant; the surety satisfying the claim; the size of the claim; and the circumstances giving rise to the claim. (Provide attachments if necessary.)

C.8 If you answer yes to the following, provide the name, address, telephone number, contact person, and circumstances relating to the question on a separate attachment.

Have you or any officer, partner, or owner of your organization, in any state or territory

of the United States, or with respect to any agency of the Federal government:

- a) In the last in the last five years, received any fines or citations for building code violations which were unrelated to design? Y____N____
- b) Ever been found to be guilty of charges relating to conflicts of interest: Y____N____
- c) Ever been convicted on charges related to any criminal activity relating to construction means, methods, or techniques; bidding or bid rigging; or bribery? Y____N____
- d) In the last five years, been found guilty of any minority contracting law violations? Y____N____
- e) In the last five years, pleaded no contest in any criminal proceeding related to contracting? Y____N____
- f) Ever been disbarred from doing Federal, state, or local government work for any reason? Y____N____
- g) Ever been terminated on a contract due to your default? Y____N____
- h) In the last five years, paid liquidated damages for being late on a project? Y____N____
- i) In the last five years, been subject to tax collection proceedings? Y____N____
- j) In the last seven years, filed for bankruptcy? Y____N____

If the answer to j) was yes, under what chapter of bankruptcy did you file?

If you filed under Chapter 11 Reorganization, how long did you operate under this status?_____

Are you operating under Chapter 11 status now? Y____N____

D. SAFETY

D.1 Have you, in the last three years, been cited for willful violations for failure to abate, or for repeated violations, by the United States Occupational Safety and Health

Administration or by the South Carolina Occupational Safety and Health Administration or by any other governmental body? Y____N____

If yes, state date, name, address, telephone number, and contact person for agency issuing citation and the nature of the violation. Also, advise the amount of fines paid, if any. Provide attachments if necessary.

D.2 List your workman's compensation experience modifier for the last three years.

E. References

E.1 Provide at least two references from each industry group listed. Provide other references as requested. Provide current names, addresses, telephone numbers, and contacts.

Architects/Engineers:

Major Subcontractors:

Financial Institutions:

Certification Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion:

Company Name:

The contractor certifies, by submission of this qualification statement or acceptance of a contract, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any State, Federal department, or agency. It further agrees by submitting this qualification statement that it will include this clause without modification in all lower tier transactions, solicitations, proposals, contracts, and subcontracts. Where the bidder/contractor or any lower tier participant is unable to certify to this statement, it shall attach an explanation to this solicitation/bid. State whether or not your company has been involved in any litigation within the past five (5) years arising out of your performance.

Circle Yes or No.

If you answer yes, explain fully if it has been involved in any litigation involving performance.

Signature _____

LOCAL VENDOR PREFERENCE – PARTICIPATION AFFIDAVIT

SECTION 2.537.1

A competitive procurement made by Beaufort County shall be made from responsive and responsible resident vendors in the County for procurement, if such bid does not exceed the lowest qualified bid from a non-county vendor by more than five (5%) percent or Ten Thousand (\$10,000.00) Dollars, whichever is less of the lowest non-county bidder. The resident vendor has the discretion to match the bid submitted by the non-county vendor and receive the contract award.

A vendor shall be deemed to be a “local vendor” if such vendor is an individual, partnership, association or corporation that is authorized to transact business within the state, maintains an office in the Beaufort County, has a business license of Beaufort County or one of the municipalities within Beaufort County, and maintains a representative inventory of commodities within Beaufort County or one of the municipalities on which the bid is submitted and has paid all taxes duly assessed.

If no bids are received, from a Beaufort County Local Vendor a vendor shall be deemed to be a “local vendor” if such vendor is an individual, partnership, association or corporation that is authorized to transact business within the state, maintains an office in Jasper, Hampton, or Colleton Counties (local preference only applies if Jasper, Hampton and Colleton Counties offer reciprocity to Beaufort County). A competitive procurement made by the county shall be made from responsive and responsible resident vendors in the respective counties for procurement, if such bid does not exceed the lowest qualified bid from a non-local vendor by more than five (5%) percent or \$10,000.00, whichever is less, local vendor has the discretion to match the bid submitted by the non-local vendor and receive the contract award.

If the procurement is to be made pursuant to state or federal guidelines, which prohibit or restrict a local or state preference, there shall be no local or state preference unless a more restricted variation is allowed under the guidelines. Local/state preference shall not be applied to the procurement of construction services.

The undersigned hereby attests that the criteria of the “RESIDENT VENDOR PREFERENCE, SECTION 2.537.1” are met for the purposes of bid document _____, dated _____

Company Name: _____ Principal Name: _____

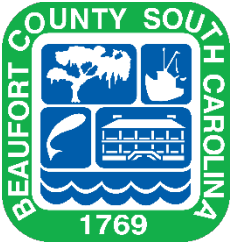
Company Address: _____

Secretary of State Designation: (Corporation, Individual, Partnership, Other) _____

Beaufort County Business License/Classification: _____

Tax Obligation Current: _____

Signature of Principal/Date: _____



Program Provisions and Good Faith Outreach Effort Requirements for Small and Minority Business Participation

**Beaufort County DNA Laboratory Additions
IFB # 052920E**

FAILURE TO COMPLETE ALL GOOD FAITH OUTREACH EFFORT REQUIREMENTS MAY RESULT IN BID REJECTION. SPECIFIED DOCUMENTS WITHIN THESE PROGRAM PROVISIONS MUST BE RETURNED WITH THE BID PACKAGE. FALSIFICATION OF ANY REQUESTED DOCUMENTS WILL BE CONSIDERED A BREACH OF PUBLIC TRUST.

Direct questions regarding these provisions to compliance@bcgov.net.

Important Actions and Notes for Bidders

- **These program provisions affect bid responsiveness** and are required for all prime bidders, regardless of whether the prime bidder is a small or minority business (SMB).
- Bidders currently registered with Beaufort County (via a Vendor Registry user account and password) can review information for local SMBs when logging into the site accessible from the County's website [here](#) or by going to "Bidding Opportunities" at the bottom of the home page and then selecting "Vendor Registration". Vendors previously registered with Beaufort County before April 2017 need to register through this new system.
- If not self-performing one hundred percent (100%) of the project with your company's workforce, bid packages should include the following items to meet compliance with these program provisions:
 1. Good Faith Efforts Checklist form.
 2. Non-Discrimination Statement form (Exhibit 1).
 3. Outreach Documentation Log (Exhibit 2).
 4. Proposed Utilization Plan (Exhibit 3).

Note: Exhibits 1-3 are available on the Beaufort County website (www.beaufortcountysc.gov) at the Purchasing Department page under "Small and Minority Business Program" [here](#).

5. Proof of sending written notice to SMBs notifying them of any bid opportunities **at least 10 business days in advance of the bid due date**. Notices only need to be sent to those subcontractors and suppliers offering the services which the bidder intends to subcontract and purchase. Notices can be e-mailed or faxed.
- If you need assistance identifying SMB firms, please contact any of the following entities:
 - **Beaufort County Purchasing Department**
Telephone: 843.255.2350
 - **SC Office of Small and Minority Business Assistance (OSMBA)**
[Business Directory](#) | Telephone: 803.734.5044 | <http://osmba.sc.gov>
 - **SC Department Of Transportation's Business Development and Special Programs**
[Business Directory](#) | Telephone: 803.737.2314 | www.scdot.org
 - **Beaufort County Black Chamber of Commerce**
Email: info@bcbcc.org
 - **Beaufort Regional Chamber of Commerce**
Email: Hello@BeaufortChamber.org
 - **Greater Bluffton Chamber of Commerce**
Email: info@blufftonchamberofcommerce.org
 - **Hilton Head Island-Bluffton Chamber of Commerce**
Email: info@Hiltonheadisland.org

Program Overview

Beaufort County recognizes that the South Carolina General Assembly, in South Carolina Code of Laws Section 11-35-5210*, has declared that businesses owned and operated by minority persons have been historically restricted from full participation in our free enterprise system to a degree disproportionate to other businesses; and that it is in the state's best interest to assist minority-owned businesses to develop fully as part of the state's policies and programs which are designed to promote balanced economic and community growth throughout the state. Therefore, Beaufort County wishes to ensure that those businesses owned and operated by minorities are afforded the opportunity to fully participate in its overall procurement process for goods and services. Further, Beaufort County seeks to ensure that small businesses are likewise afforded the same participation opportunity as minority businesses. Consequently, attention of all bidders is called to contract provisions contained herein pertaining to Beaufort County's "Small and Minority Business Participation Program", as described in the Beaufort County Code of Ordinances, Section 2-537.2**.

Pre-Award and Post-Award Requirements

Beaufort County requires all bidders for this project to fulfill specific good faith outreach efforts. The successful bidder (contractor) is required to fulfill any commitments made to the best of their ability in conjunction with pre-award good faith outreach efforts, unless good cause is demonstrated for any failure to fulfill such commitment. Beaufort County shall have the right to inspect the contractor's records related to the activity and expenditures to SMBs utilized on County projects, to include related contracts and purchase orders and payment records, such as cancelled check copies. Further, Beaufort County personnel are permitted access to County project sites with the purpose of confirming workers on the project. Beaufort County may require the contractor to provide post-award reports regarding its utilization and expenditures to small and minority businesses on Beaufort County projects.

Definitions

Minority Business means a concern at least fifty-one percent (51%) owned by a person determined to be socially and economically disadvantaged. *Socially disadvantaged* means those persons who have been subject to racial or ethnic prejudice or cultural bias because of their identification as members of a certain group without regard to their individual qualities. Such groups include, but are not limited to, Black Americans, Hispanic Americans, Native Americans (including American Indians, Eskimos, Aleuts and Native Hawaiians), Asian Pacific Americans, women, and other minorities to be designated by the state or Beaufort County. *Economically disadvantaged* means those socially disadvantaged persons whose ability to compete in the free enterprise system has been impaired due to diminished capital and credit opportunities as compared to others in the same business area that are not socially disadvantaged.

Small Business means a for-profit concern that is independently owned and operated, not dominant in the field of operation in which it is bidding on government contracts, and qualified as a small business under the criteria and size standards in the Code of Federal Regulations, Title 13, Part 121***, as amended.

* South Carolina Code of Laws, Chapter 35 "South Carolina Consolidated Procurement Code", Article 21 "Assistance to Minority Businesses".

** Beaufort County Code of Ordinances, Article 7 "Finance, Division 4 "Purchasing", Section 2-537.2 "Small and Minority-owned Business Program".

*** Code of Federal Regulations, Title 13 "Business Credit and Assistance", Chapter 1 "Small Business Administration", Part 121 "Small Business Size Standards".

Self-Performance Affidavit

If self-performing 100% of the entire project with your own workforce/staff on your payroll, complete and return this form with your bid package. If self-performing all work, you do not need to solicit SMBs.

I hereby certify my company's intent to self-perform 100% of the work required for the referenced project:

Project Name: _____

Project Number: _____

By signing this affidavit, I further certify that my company has the capability to perform and will perform all elements of the work on the project referenced above with my company's employees.

I further agree to provide additional information or documentation requested by Beaufort County in support of the above statement.

If a need to subcontract work on this project arises, I will notify the Beaufort County Purchasing Department in writing via email to dthomas@bcgov.net within two (2) business days after submission of the bid.

Name of Company

Owner or Authorized Representative Name

Signature

Title

Date

State of _____ County of _____

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

Notary Public _____ My Commission Expires _____

Good Faith Efforts Checklist

This form and supporting documents are due with the bid package, if not self-performing 100% of the work.

- Include copies of the written notice to SMBs notifying them of bid opportunities. Notices only need to be sent to those subcontractors and suppliers offering the services which the bidder intends to subcontract and purchase. Notices can be e-mailed or faxed. If emailed, the notice may be sent to all applicable subcontractors with one email. If faxed, include a copy of the fax transmittal confirmation slip. The notice should contain the following:
 - Bidder's name and contact information
 - Project name and number
 - Scope of work/bid packages available for subcontracting
 - Information on availability of plans and specifications
 - Bidder's insurance, bonding, and financial requirements

- Include Exhibits 1, 2 and 3, with all requested supporting documentation, where applicable. These exhibits are available on the Beaufort County website (www.beaufortcountysc.gov) under the Purchasing Department page.

The undersigned acknowledges making a good faith effort to comply with the above areas checked.

Name of Company

Owner or Authorized Representative Name

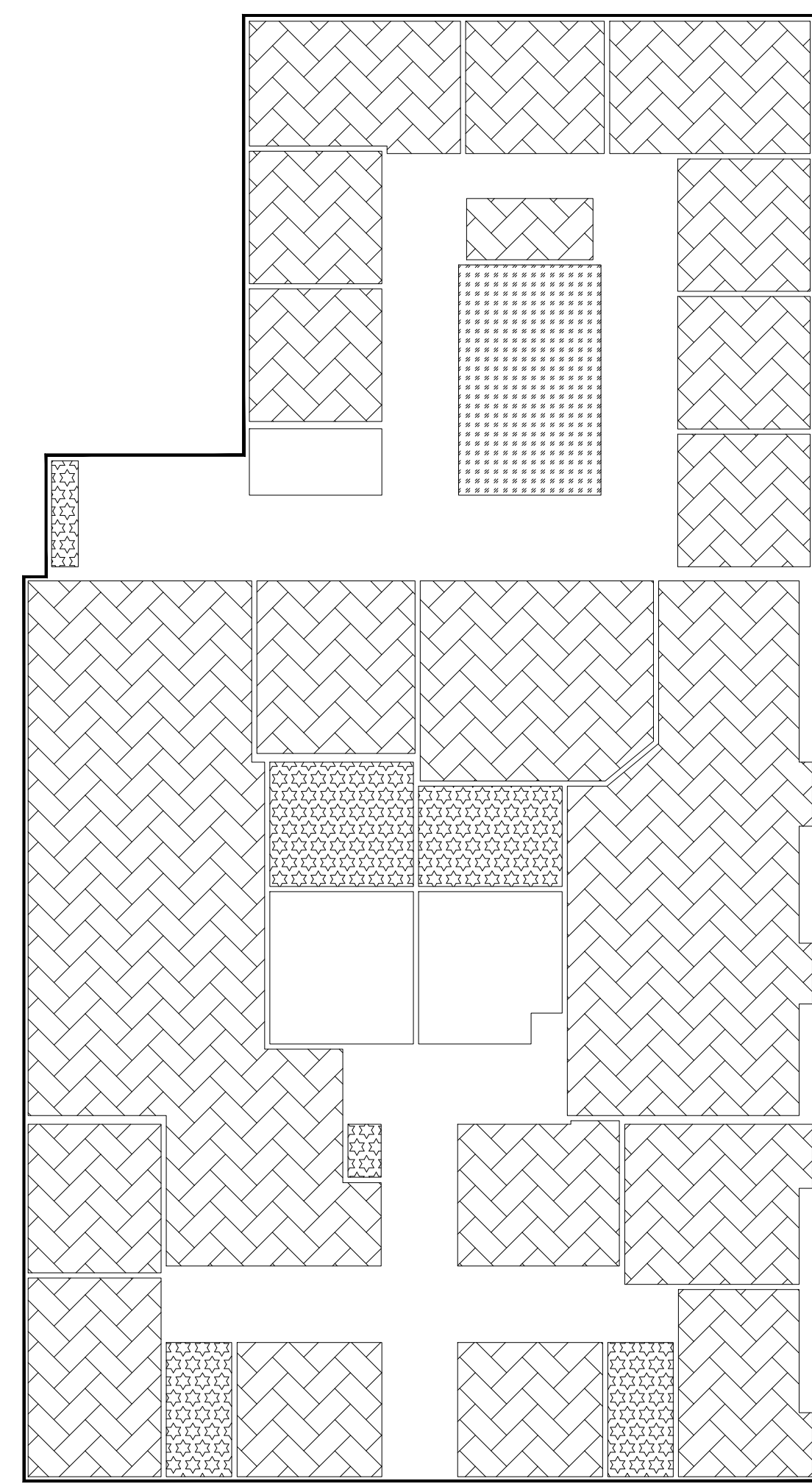
Signature

Title

Date

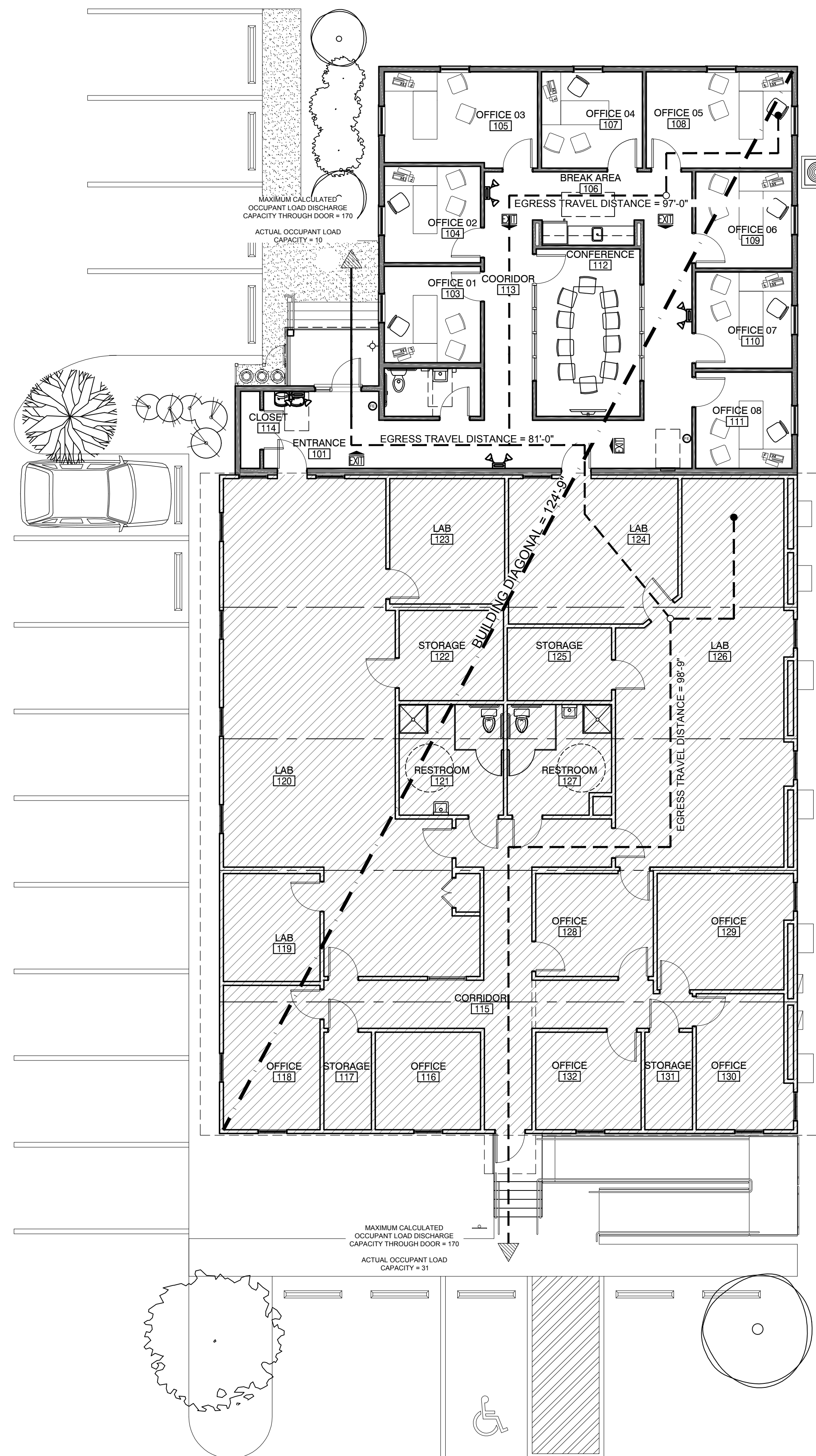
EXHIBIT 2
Construction Plans

**IN ACCORDANCE WITH THE 2018
INTERNATIONAL BUILDING CODE, CHAPTER 10
(MEANS OF EGRESS), TABLE 1006.2.1 AND
TABLE 1006.3.3(2), SINCE THE EXISTING
BUILDING HAS AN OCCUPANT LOAD OF FEWER
THAN 30 PEOPLE, A SECOND MEANS OF
EGRESS (IN ADDITION TO THE MAIN ENTRANCE
/ EXIT) DOES NOT HAVE TO BE MAINTAINED**



B4 OCCUPANCY DIAGRAM
3/32" = 1'-0"
0 4 8' 16'

USE GROUP OR SPACE DESCRIPTION	AREA SQ FT	AREA PER OCCUPANT (TABLE 1004.1.2)	CALCULATED OCCUPANT LOAD (a/b)
OFFICE / BUSINESS	3,804	150 GROSS	26
BOARD ROOM-MULTI-PURPOSE / ASSEMBLY	187	15 NET	13
STORAGE	309	300 GROSS	2
TRAVEL / UNOCCUPIED SPACE	1,775	N/A	-
TOTAL			41



A2 LIFE SAFETY PLAN
1/8" = 1'-0"
0 4 8' 16'

GENERAL NOTES:

- ALL EXIT DOORS SHALL BE EQUIPPED WITH EXIT SIGNS AND EMERGENCY EGRESS LIGHT.
- COORDINATE FIRE EXTINGUISHER TYPES AND LOCATIONS WITH FIRE MARSHALL PRIOR TO INSTALLING.

SHEET KEY NOTES:

- EGRESS TRAVEL DISTANCE MEASURED TO PUBLIC WAY
- EXISTING KNOX BOX

2015 IBC EGRESS REQUIREMENTS:

OCCUPANT LOAD: 41 PEOPLE
 BUILDING IS FIRE SPRINKLERED: NO
 OCCUPANCY TYPE: BUSINESS
 MAXIMUM TRAVEL DISTANCE: 200'-0" (98'-8" SHOWN)
 MAXIMUM DEAD END CORRIDOR: 20'-0" (NONE)
 MINIMUM NUMBER OF EXITS: 2 (OCCUPANT LOAD IS GREATER THAN 50)
 MINIMUM CORRIDOR WIDTH: 36" (60" PROVIDED)

EGRESS NOTES:

- BUILDING DIAGONAL IS = 124'-9"
- REQUIRED DISTANCE BETWEEN EXIT DOORS IS 62'-5" (1/2 OF DIAGONAL). ACTUAL DISTANCE IS 79'-5"
- ALL EGRESS DOORS ARE 36" WIDE AND PROVIDE A MINIMUM 32" CLEAR OPENING
- PRIMARY OCCUPANCY IS: BUSINESS

FIRE DEPARTMENT NOTES:

- KNOX BOX IS EXISTING
- COORDINATE WITH FIRE MARSHALL FOR LOCATION OF FIRE EXTINGUISHERS.

LEGEND:

- BUILDING DIAGONAL
- EXIT ACCESS TRAVEL DISTANCE
- START OF TRAVEL DISTANCE / COMMON PATH OF EGRESS TRAVEL
- END OF COMMON PATH OF EGRESS TRAVEL POINT AT WHICH TWO EXIT PATHS ARE AVAILABLE
- EXIT DISCHARGE
 - SINGLE OR DOUBLE DOOR WITH A MINIMUM 34" CLEAR OPENING
 - CEILING MOUNTED ILLUMINATED EXIT SIGN
 - ILLUMINATED EXIT SIGN AND EMERGENCY EXIT LIGHT COMBO ON INSIDE AND EMERGENCY LIGHT ON OUTSIDE. 90 MINUTE BATTERY BACKUP ON ALL
- ROOM TAG
 - ROOM NAME
 - ROOM NUMBER
- EXTERIOR EMERGENCY EGRESS LIGHT WITH 90 MIN EMERGENCY BATTERY BACKUP
- LED EXIT SIGN WITH LED EMERGENCY "LIGHT PIPE" PROVIDE WITH 90 MINUTE BATTERY BACKUP AND PUSH TO TEST SWITCH. ARROW INDICATES DIRECTION OF EGRESS TRAVEL
- PORTABLE HAND HELD TYPE ABC FIRE EXTINGUISHER IN NON-LOCKING SEMI-RECESSED CABINET
- PORTABLE HAND HELD TYPE K FIRE EXTINGUISHER MOUNTED TO WALL IN MANUFACTURER PROVIDED BRACKET. NOTE: PROVIDE BLOCKING IN WALL AND MOUNT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. MOUNTED WITH TOP NO MORE THAN 5'-0" AFF. REVIEW EXTINGUISHER TYPES AND LOCATIONS WITH LOCAL FIRE MARSHALL PRIOR TO INSTALLING BLOCKING. EXTINGUISHER AND INSTALLATION PER NFPA 10
- EXISTING BUILDING, NO WORK IN THIS AREA

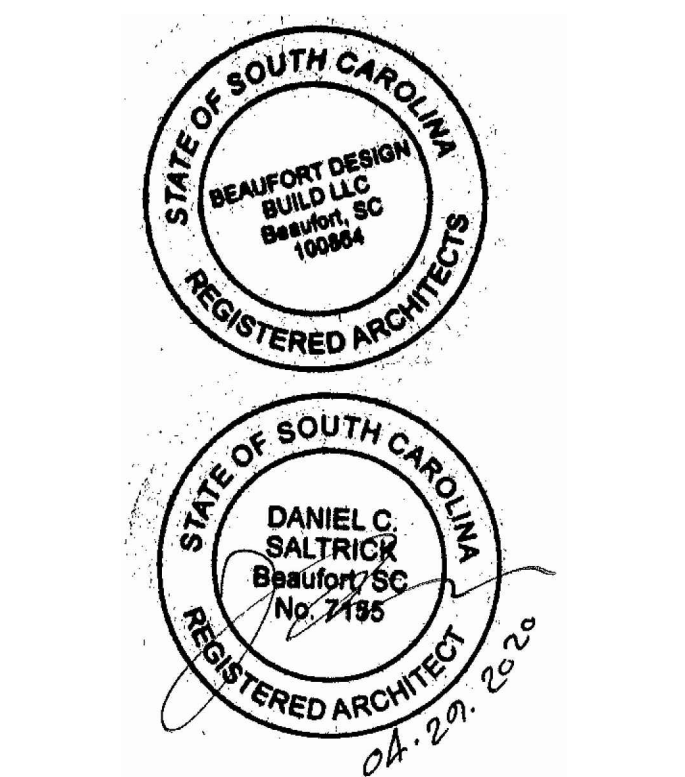
**EXISTING BUILDING IS NOT
FIRE SPRINKLER,
PROPOSED ADDITION WILL
NOT BE PROVIDED WITH A
FIRE SPRINKLER SYSTEM**

BEAUFORT
2 Fire Station Lane
Seabrook, SC 29940

CHARLOTTE
7315 Swainsa Lane
Cornellus, NC 28031

(843) 466-3664
info@beaufortdesignbuild.com
www.beaufortdesignbuild.com

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ARCHITECT / ENGINEER'S SEAL



**BEAUFORT COUNTY
ENGINEERING**

**BEAUFORT COUNTY DNA
LABORATORY ADDITION**

111 INDUSTRIAL VILLAGE RD
BEAUFORT, SC 29906

**FOR
CONSTRUCTION**

NO.	DESCRIPTION	DATE

SHEET INFORMATION

DATE	APRIL 29, 2020
JOB NUMBER	19044.00
DRAWN	ADB
CHECKED	ADB
APPROVED	DCS

LIFE SAFETY PLAN

G-103

1. **GENERAL:**
- A. THE WORK COVERED BY THESE SPECIFICATIONS CONSISTS OF FURNISHING ALL LABOR, EQUIPMENT, MATERIALS & SUPPLIES AS NECESSARY FOR THE COMPLETE AND SATISFACTORY OPERATION OF THE SYSTEM AS SHOWN ON THE PLANS.
 - B. ALL WORK SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE, NFPA, STATE BUILDING CODE, AND ANY OTHER LOCAL REQUIREMENTS THAT MAY APPLY.
 - C. CONTRACTOR SHALL OBTAIN AND PAY FOR ALL ELECTRICAL PERMITS AND INSPECTION FEES.
 - D. ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND SHALL BE LISTED BY THE UNDERWRITER'S LABORATORIES, INC. OR BY A STATE APPROVED THIRD PARTY TESTING AGENCY FOR THE USE INTENDED UNDER A STANDARD LISTING. SUCH MATERIALS AND USE EXISTS. ALL ITEMS OF THE SAME TYPE AND RATING SHALL BE IDENTICAL AND OF THE SAME MANUFACTURER.
 - E. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND CATALOG DATA IN ELECTRONIC FORMAT (PDF) FOR ALL ELECTRICAL ITEMS IN THE SCOPE OF WORK, INCLUDING, BUT NOT LIMITED TO, RACEWAYS, BOXES, FITTINGS, CONDUCTORS, LUMINAIRES, LAMPS, BALLASTS, WIRING DEVICES, SAFETY SWITCHES, DISCONNECTS, TRANSFORMERS, PANEL BOARDS, FIRE ALARM, TELECOMMUNICATIONS, ETC. FOR APPROVAL AS APPLICABLE FOR THE PROJECT. ONE COMPLETE SET OF APPROVED SUBMITTALS SHALL BE MAINTAINED AT THE JOB SITE.
 - F. ALL COST ASSOCIATED EQUIPMENT TO COMPLY WITH THE BASIS OF DESIGN, INCLUDING PROVIDING MAINTENANCE ACCESS, CLEARANCE, CONDUIT, WIRING, REPLACEMENT OF OTHER SYSTEM COMPONENTS, BUILDING ALTERATIONS, METHODS, ETC., SHALL BE INCLUDED IN THE ORIGINAL BASE BID. NO ADDITIONAL COSTS ASSOCIATED WITH SUBSTITUTED EQUIPMENT WILL BE APPROVED AFTER BIDS HAVE BEEN ACCEPTED AND ALL COSTS WILL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR. CREDITS SHALL BE GIVEN TO THE OWNER WHERE SUCH EQUIPMENT AND METHOD RESULT IN LESS EXPENSE TO THE CONTRACTOR.
 - G. ONE COMPLETE SET OF THE LATEST CONSTRUCTION PLANS OF ALL TRADES SHALL BE MAINTAINED AT THE JOB SITE. ALL ADDENDUMS, CORRECTIONS, BULLETINS, AND/OR SKETCHES SHALL BE INCORPORATED INTO THE ON-SITE CONSTRUCTION PLANS AS THE JOB PROGRESSES.
 - H. COMPLETELY ADEQUATE HOUSING SHALL BE PROVIDED FOR ALL MATERIALS STORED ON JOB SITE. ONLY CONDUIT MAY BE STORED OUTSIDE, BUT NOT IN CONTACT WITH THE GROUND.
 - I. THE CONDUIT AND WIRING SYSTEM SHALL BE GROUNDED AT THE MAIN SERVICE EQUIPMENT. GROUNDING ELECTRODE SYSTEM SHALL BE INSTALLED PER NEC 250.
 - J. PROVIDE AN INTERSYSTEM BONDING TERMINATION DEVICE AT THE MAIN ELECTRICAL SERVICE PER NEC 250.94.
 - K. WIRING SHALL BE TESTED FOR CONTINUITY AND GROUNDS BEFORE BEING ENERGIZED. FAULTY WIRING SHALL BE REPLACED AT NO ADDITIONAL EXPENSE TO THE OWNER.
 - L. PROVIDE ALL CUTTING AND PATCHING FOR INSTALLATION OF WORK AND REPAIR ANY DAMAGE DONE.
 - M. THE ELECTRICAL CONTRACTOR SHALL CONNECT ALL EQUIPMENT REQUIRING ELECTRICAL CONNECTIONS (UNLESS OTHERWISE NOTED), EXCEPT FOR CONTROL WIRING FOR EQUIPMENT NOT PROVIDED BY THE ELECTRICAL CONTRACTOR. CONTROL WIRING FOR SUCH EQUIPMENT SHALL BE PROVIDED BY THE RESPECTIVE DISCIPLINE.
 - N. ALL ELECTRICAL JUNCTION BOXES, SWITCHGEAR, CABLING, VOICE/DATA OUTLETS, LOW VOLTAGE CABINETS, EMERGENCY RECEPTACLES, ETC. SHALL BE LABELED ACCORDING TO THE NATIONAL FIRE ALARM CODE, NFPA 72, AND ALL OTHER APPLICABLE CODES AND STANDARDS.
 - O. UPON COMPLETION OF WORK, CONTRACTOR SHALL PRESENT ENGINEER WITH CERTIFICATE OF APPROVAL FROM LOCAL INSPECTOR AND/OR AUTHORITY HAVING JURISDICTION BEFORE WORK WILL BE APPROVED FOR FINAL PAYMENT.
 - P. CONTRACTOR SHALL GUARANTEE ALL WORKMANSHIP FOR A PERIOD OF ONE YEAR EFFECTIVE THE DATE THE PROJECT IS ACCEPTED BY THE OWNER. ANY IMPERFECT MATERIALS OR WORKMANSHIP SHALL BE REPLACED WITHOUT ADDED COST TO THE PROJECT.
 - Q. IT SHALL NOT BE THE INTENT OF ISSUED PLANS AND/OR SPECIFICATIONS TO SHOW EVERY MINOR DETAIL OF CONSTRUCTION. THE ELECTRICAL CONTRACTOR IS EXPECTED TO FURNISH AND INSTALL ALL NECESSARY ITEMS FOR A COMPLETE AND OPERATING SYSTEM.
 - R. THE WORD "PROVIDE" MEANS THAT THIS CONTRACTOR SHALL FURNISH, FABRICATE, ERECT, CONNECT, AND COMPLETELY INSTALL SYSTEMS IN PROPER OPERATING CONDITION. ALL LABOR, EQUIPMENT, MATERIALS, AND INCIDENTAL MATERIALS REQUIRED SHALL BE INCLUDED AS PART OF THIS WORK TO COMPLETE THE INSTALLATION.
 - S. THE WORD "CONNECT" MEANS THAT THIS CONTRACTOR SHALL PROVIDE (SEE DEFINITION ABOVE) ALL DISCONNECTING MEANS, OVERCURRENT PROTECTION AND WIRING REQUIRED TO PLACE THE EQUIPMENT AND SYSTEMS IN PROPER OPERATING CONDITION AND TO COMPLY WITH CODE REQUIREMENTS.
 - T. CONTRACTOR SHALL COORDINATE THE LOCATION OF ALL OUTLET LOCATIONS WITH ARCHITECTURAL FLOOR PLANS, ELEVATIONS, AND MILLWORK SHOP DRAWINGS PRIOR TO ROUGH-IN.
 - U. ELECTRICAL CONTRACTOR SHALL NOT SCALE PLANS. CONTRACTOR SHALL REFER TO ARCHITECTURAL PLANS AND ELEVATIONS FOR EXACT LOCATIONS OF ALL EQUIPMENT, UNLESS OTHERWISE NOTED.
 - V. CONTRACTOR SHALL TEST ALL "SAFETY" EQUIPMENT AND SYSTEMS FOR PROPER FUNCTION AND OPERATION. UPON SUCCESSFUL COMPLETION OF TESTS, CONFIRMATION SHALL BE SENT TO THE ENGINEER OF RECORD IN THE FORM OF A LETTER STATING THE TESTS PERFORMED, THE RESULTS, AND THE DATE TESTS WERE SUCCESSFULLY COMPLETED. ALL SAFETY EQUIPMENT AND SYSTEMS CONSIST OF THOSE AS SPECIFIED IN THE STATE BUILDING CODE, THE NATIONAL ELECTRICAL CODE (NEC), NFPA 101, AND ANY OTHER LOCAL REQUIREMENTS THAT MAY APPLY.
 - W. IF DURING THE COURSE OF WORK, THE CONTRACTOR DISCOVERS A PROBLEM WITH THE PERFORMANCE OF THE INSTALLATION RELATIVE TO THE PLANS AND SPECIFICATIONS, THE NEC, OR OTHER APPLICABLE CODES, THE CONTRACTOR SHALL IMMEDIATELY BRING THE PROBLEM TO THE ATTENTION OF THE ARCHITECT AND/OR ENGINEER FOR RESOLUTION PRIOR TO THE EXECUTION OF THE WORK.
 - X. WHERE THERE ARE CONFLICTS BETWEEN THE PLANS AND SPECIFICATIONS, THE CONTRACTOR SHALL BRING THE ISSUE TO THE ATTENTION OF THE ENGINEER FOR RESOLUTION PRIOR TO THE EXECUTION OF THE WORK OR ORDERING ANY MATERIALS. NO ADDITIONAL COSTS SHALL BE WARRANTED WITHOUT A CHANGE TO THE PROJECT SCOPE.
2. **RACEWAY:**
- A. CONDUIT SHALL BE MANUFACTURED BY ALLED, WHEATLAND, REPUBLIC CONDUIT, WESTERN TUBE, OR APPROVED EQUIVALENT.
 - B. FOR INTERIOR WORK, CONDUIT SHALL BE ZINC COATED EMT EXCEPT WHERE NOT PERMITTED BY CODE. USE SCHEDULE 40 PVC BELOW CONCRETE SLAB, IN DUCTBANKS, AND FOR EXTERIOR WORK WHERE NOT SUBJECT TO DAMAGE. USE IMC WHERE SUBJECT TO PHYSICAL DAMAGE.
 - C. EMT FITTINGS SHALL BE COMPRESSION GLAND TYPE, OF MALLEABLE STEEL. CONNECTORS SHALL HAVE INSULATED THROATS. CAST, SET SCREW, OR INDENTER TYPE FITTINGS ARE NOT ACCEPTABLE. ALL FITTINGS FOR EMT SHALL BE MADE OF STEEL.
 - D. ALL RACEWAY SHALL BE RUN CONCEALED, UNLESS OTHERWISE NOTED. FISH ALL NEW OUTLETS IN EXISTING WALLS, WHERE POSSIBLE. ALL RUNS SHALL BE NEAT AND SQUARE.
 - E. LOW VOLTAGE CABLING NOT SPECIFIED TO BE INSTALLED IN CONDUIT, SHALL BE INSTALLED IN A CABLE TRAY SYSTEM OR J-HOOK SYSTEM CONSISTING OF MINIMUM 2" DIAMETER HOOKS LOCATED ON 3'-0" CENTERS IN ALL ACCESSIBLE CEILING. WHERE THERE ARE INACCESSIBLE CEILING, PROVIDE CONDUIT FOR ENTIRE LENGTH OF INACCESSIBILITY.
 - F. RACEWAYS USED FOR LOW VOLTAGE SYSTEMS SUCH AS TELECOMMUNICATIONS, FIRE ALARM, SECURITY, CCTV, CONTROLS, AND SIMILAR CONDUITS ABOVE THE CEILING AND BACKBOARD(S) SHALL BE PROVIDED WITH INSULATED THROAT BUSHINGS AT EACH CONDUIT TERMINATION. THESE BUSHINGS SHALL BE INSTALLED PRIOR TO PULLING LOW-VOLTAGE CABLES.
 - G. RACEWAY PENETRATIONS THROUGH FLOOR SLABS AND FIRE-RATED WALLS SHALL BE FILLED WITH IMPERVIOUS, NON-SHRINK GROUT SUFFICIENTLY TIGHT TO PREVENT THE TRANSFER OF SMOKE, WATER, AND DUST. ROOF PENETRATIONS SHALL BE WITHIN THE EQUIPMENT ROOF CURB.
 - H. SUPPORT ALL CONDUIT WITH STRAPS AND CLAMPS.
 - I. ALL CONDUIT SHALL BE RUN PARALLEL OR PERPENDICULAR TO BUILDING LINES, WHETHER EXPOSED OR NOT AND SUPPORTED FROM STRUCTURE AND PROPERLY SECURED.
 - J. WHERE CONDUITS PASS THROUGH A BUILDING EXPANSION JOINT, PROVIDE GALVANIZED EXPANSION FITTINGS WITH BONDING JUMPS.
 - K. MINIMUM CONDUIT SIZE SHALL BE 3/4" FOR INTERIOR WORK, 1" FOR EXTERIOR WORK.
 - L. PROVIDE MINIMUM 210# TEST NYLON PULL CORD AND NYLON BUSHINGS IN ALL EMPTY RACEWAYS.
 - M. LIQUID-TIGHT METAL CONDUIT SHALL ONLY BE USED FOR FINAL CONNECTIONS TO EQUIPMENT AND ALL OTHER ROTATING AND VIBRATING EQUIPMENT, MAXIMUM LENGTH OF 3'-0".
 - N. FLEXIBLE METAL CONDUIT, MINIMUM SIZE 3/8", SHALL ONLY BE USED FOR FINAL CONNECTION TO LIGHTING FIXTURES, MAXIMUM LENGTH OF 6'-0".
 - O. PROVIDE PULL BOXES, SUCH THAT NO SINGLE CONDUIT RUN HAS BENDS IN EXCESS OF 360°. PULL BOXES SHALL BE SUITABLE AND APPROVED FOR THE INTENDED USE. WHERE CONDUITS PASS UNDER PAVED AREAS, THEY SHALL BE RIS.
 - P. ALL CONDUIT BENDS/ELBOWS EMERGING FROM UNDERGROUND SHALL BE IMC AND SHALL EXTEND A MINIMUM OF 18" BELOW GRADE.
 - Q. ALL UNDERGROUND RACEWAYS SHALL BE THOROUGHLY COATED WITH TWO COATS OF ASPHALTUM BITUMASTIC.
 - R. ALL CONDUITS INSTALLED UNDERGROUND OR IN CONCRETE SHALL HAVE JOINTS MADE WATER-TIGHT WITH AN EPDM OR POLYETHYLENE TAPE.
 - S. THE USE OF AC OR NM CABLE IS NOT PERMITTED.
- OUTLET BOXES:**

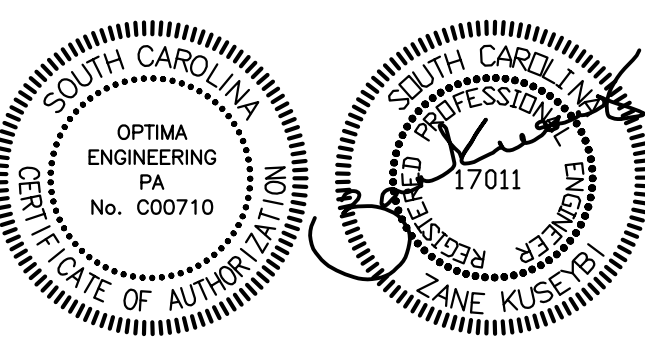
- A. JUNCTION AND PULL BOXES SHALL BE CODE GAUGE GALVANIZED STEEL. ACCEPTED MANUFACTURERS SHALL BE STEEL CITY (THOMAS & BETTS), RACO, CROUSE-HINDS, APFLETON (EMERSON), OR APPROVED EQUIVALENT.
 - B. OUTLET BOXES SHALL NOT BE MOUNTED BACK TO BACK IN COMMON WALLS.
 - C. ATTACH EMT WITH CONNECTORS HAVING GALVANIZED THROUGH HOLES.
 - D. ATTACH BOXES TO STUD WORK USING CADDY BAR STRAPS THAT CONNECT TO TWO ADJACENT STUDS TO PREVENT WASTY OF BOX IN WALL.
 - E. ALL OUTLET BOXES (INCLUDING TELEPHONE, CABLE TV, AND COMPUTER) SHALL HAVE COVER PLATES. BLANK NOT PERMITTED.
 - F. ALL EXTERIOR BOXES SHALL BE WATER-TIGHT.
4. **CONDUCTORS:**
- A. CONDUCTORS SHALL BE MANUFACTURED BY SOUTHWIRE (SIMPULL), ENCORE (SUPERGLICO), UNITED COPPERWORKS (UNICO), CERRO (SLP), OR APPROVED EQUAL, "PRE-LUBRICATED" BY THE MANUFACTURER.
 - B. ALL CONDUCTORS SHALL BE COPPER, RATED 75° C WET/DRY EXCEPT WHERE OTHERWISE NOTED OR REQUIRED BY U.L. OR OTHER CODES.
 - C. ALL CONDUCTORS SHALL BE SINGLE INSULATED CONDUCTOR. THHN/THWN-2 SIZES #10 AWG AND SMALLER SHALL BE SOLID, SIZES #8 AWG AND LARGER SHALL BE STRANDED.
 - D. BRANCH CIRCUIT SHALL NOT BE SMALLER THAN #12 AWG. CONTROL WIRING MAY BE #18 AWG.
 - E. CONDUCTORS SHALL BE COLOR CODED BLACK/RED/BLUE FOR 120/208 VOLT SYSTEMS AND BROWN/ORANGE/YELLOW FOR 277/480 VOLT SYSTEMS FOR A, B, AND C PHASES, RESPECTIVELY. NEUTRAL SHALL BE WHITE FOR 120/208 VOLT SYSTEMS AND NATURAL GRAY FOR 277/480 VOLT SYSTEMS. GROUND SHALL BE CONDUCTOR SHALL BE GREEN ON ALL SYSTEMS. ALL CONDUCTOR SIZES SHALL HAVE COLOR-CODED INSULATION. THE USE OF COLORED TAPE ON LARGER WIRE SIZES SHALL NOT BE ALLOWED.
 - F. INSULATION SHALL BE DUAL RATED TYPE THHN/THWN-2 FOR FEEDERS AND BRANCH CIRCUITS. FIXTURE TAPS SHALL BE #12 THHN/THWN-2 IN FLEX WITH GREEN #12 AWG GROUNDING CONDUCTOR.
 - G. ALL CONDUCTORS SHALL BE IN CONDUIT.
 - H. WIRING TO LIGHTING FIXTURES SHALL BE AS REQUIRED BY UL LABEL.
 - I. MULTI-WIRE BRANCH CIRCUITS SHALL NOT BE ALLOWED, UNLESS EXPLICITLY INDICATED ON THE DRAWINGS. WHERE EXPLICITLY INDICATED ON THE DRAWINGS:
 - 1) ALL 20A MULTI-WIRE RECEPTACLE CIRCUITS SHALL UTILIZE A #10 AWG NEUTRAL CONDUCTOR.
 - 2) ONLY WHERE PERMITTED UNDER "RACEWAYS", MC CABLE ASSEMBLIES CAN BE AFC "SPRING NEUTRAL" OR EQUAL, UNLESS OTHERWISE INDICATED ON THE DRAWINGS. WHERE MULTI-WIRE BRANCH CIRCUITS ARE EXPLICITLY INDICATED ON THE DRAWINGS, THE CONDUCTORS SHALL BE INSTALLED PER NEC 210.4. MEANS SHALL BE PROVIDED TO SIMULTANEOUSLY DISCONNECT ALL UNGROUNDED CONDUCTORS AT THE POINT WHERE THE BRANCH CIRCUIT ORIGINATES IN ADDITION TO OTHER REQUIREMENTS PER NEC 210.4.
 - J. JOINTS IN #10 AWG AND SMALLER SHALL BE MADE UP WITH CRIMPED CONNECTORS WITH INSULATING CAPS (NO TAPE) OR WIRENUTS (MAXIMUM OF 3 CONDUCTORS UNDER ANY CONNECTOR OR WIRENUT). LARGER WIRE SHALL USE SPLIT BOLTS OR BOLTED CLAMPS.
 - K. ALL WIRING LUGS THROUGHOUT THE PROJECT, INCLUDING, BUT NOT LIMITED TO, BREAKERS, PANELBOARD/SWITCHBOARD LUGS, SAFETY SWITCH LUGS, MOTOR STARTER LUGS, TRANSFORMERS LUGS, WIRENUTS, AND ALL EQUIPMENT LUGS/TERMINALS SHALL BE RATED FOR USE WITH 75 DEGREE INSULATED CONDUCTORS AT THEIR 75 DEGREE AMPACITY AND SHALL BE SIZED AND SELECTED TO MATCH THE CONDUCTOR SIZE AND MATERIAL.
 - L. CIRCUIT JOINTS SHALL NOT BE MADE ON DEVICE TERMINALS.
 - M. WIRE WITHIN PANELBOARDS SHALL BE NEATLY TRAINED, SQUARED, BUNCHED, AND TAGGED.
 - N. ALL SYSTEM FURNITURE CONNECTIONS SHALL COMPLY WITH NEC 605.
 - O. GROUND ALL EQUIPMENT PER NEC ARTICLE 250. BOND WHERE CONDUITS ENTER ENCLOSURES THROUGH CONCENTRIC KNOCKOUTS. ALL FLEX, INCLUDING FIXTURE TAPS, SHALL INCLUDE GREEN GROUNDING CONDUCTORS #12 AWG MINIMUM. PROVIDE GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR IN EACH CONDUIT AND FOR EACH CIRCUIT, SIZED PER NEC 250-122.
 - P. ALL CONDUCTORS INSTALLED IN VERTICAL RACEWAYS SHALL BE SUPPORTED AT INTERVALS AS REQUIRED PER NEC 300-19.
 - Q. THE ELECTRICAL CONTRACTOR SHALL FOLLOW AND APPLY THE TABLE BELOW, REGARDLESS WHAT THE PANEL SCHEDULE INDICATES, FOR SIZING ALL 120V & 277V, 20 AMP BRANCH CIRCUITS (COPPER CONDUIT) TO ALLOW A MAXIMUM OF 3% VOLTAGE DROP FROM THE CIRCUIT BREAKER TO THE FIRST DEVICE ON THE BRANCH CIRCUIT AND ACHIEVE A MAXIMUM OF 5% VOLTAGE DROP ACROSS THE ENTIRE BRANCH CIRCUIT.
- | VOLTAGE | CONDUCTOR LENGTH* | # | BRANCH CIRCUIT |
|---------|-------------------|-----|----------------|
| 120 | 0' - 30' | #12 | #10 |
| 120 | 31' - 90' | #10 | #8 |
| 120 | 91' - 140' | #8 | #6 |
| 120 | 141' - 225' | #6 | #4 |
- * - THE LENGTH IS MEASURED FROM THE CIRCUIT BREAKER TO THE FIRST DEVICE WHICH THE BRANCH CIRCUIT SERVES. WHERE THE DISTANCE EXCEEDS ABOVE, CONSULT WITH THE ENGINEER.
5. **WIRING DEVICES:**
- A. WIRING DEVICES SHALL BE SPECIFICATION GRADE, MINIMUM, EQUAL TO COOPER QUALITY INDICATED BELOW OR AS MANUFACTURED BY HUBBELL, LEGRAND-PASS & SEYMOUR, LEVITON, OR APPROVED EQUAL, UNLESS OTHERWISE NOTED.
- SWITCHES (120/277V) SHALL BE AS FOLLOWS:
- | | |
|--------------------|---------------|
| SINGLE-POLE 20 AMP | COOPER AH1221 |
| DOUBLE-POLE 20 AMP | COOPER AH1222 |
| THREE-WAY 20 AMP | COOPER AH1223 |
| FOUR-WAY 20 AMP | COOPER AH1224 |
- DUPLEX RECEPTACLES SHALL HAVE A NYLON FACE AND SHALL BE AS FOLLOWS:
- | | |
|--------------------|---------------|
| 20 AMP DUPLEX | COOPER 5352 |
| 20 AMP DUPLEX GFCI | COOPER 56P20F |
- THE PART NUMBERS ABOVE ARE FOR WIRING DEVICE TYPE ONLY. SEE BELOW FOR WIRING DEVICE COLOR AND DETAIL MATERIAL/COLOR.
- B. SEE MOUNTING HEIGHT ELEVATION DETAIL FOR STANDARD MOUNTING HEIGHTS OF ALL DEVICES, UNLESS OTHERWISE NOTED.
 - C. THE COLOR OF ALL WIRING DEVICES (SWITCHES AND RECEPTACLES) SHALL BE AS DIRECTED BY THE ARCHITECT, UNLESS OTHERWISE NOTED. ALL COVER PLATES SHALL BE 302 STAINLESS STEEL. COVER PLATES IN MASONRY WALLS SHALL BE JUMBO SIZE.
 - D. EACH DUPLEX RECEPTACLE INDICATED TO BE ON A DEDICATED CIRCUIT SHALL BE 20 AMP TYPE.
 - E. ADJACENT DEVICES SHALL HAVE A COMMON WALL PLATE.
 - F. WEATHERPROOF COVERS SHALL BE "WHITE-IN-USE" SO PLUGS MAY BE INSTALLED WITHOUT COMPROMISING THE WF FUNCTION. COOPER #MU-2 "DOUBLE-GANG WITH CLEAR COVER OR APPROVED EQUAL.
 - G. A MAXIMUM OF 10 GENERAL PURPOSE RECEPTACLES SHALL BE ON EACH BRANCH CIRCUIT.
 - H. DIMMERS SHALL BE LINEAR SLIDE, PRESENT ON/OFF, SQUARE LAW DIMMING, W/RFT FILTERING AND VOLTAGE COMPENSATION CIRCUITING.
 - I. ALL WALL MOUNTED OCCUPANCY/VACANCY SENSORS/SWITCHES SHALL BE INSTALLED WITH AN EQUIPMENT GROUNDING CONDUCTOR.
 - J. GROUND-FAULT CIRCUIT-INTERRUPTER (GFCI) PROTECTION FOR PERSONNEL SHALL BE PROVIDED FOR ALL LOCATIONS PER NEC 210.8. INSTALLED IN A READILY ACCESSIBLE LOCATION. WHERE A DEVICE LOCATION IS NOT ACCESSIBLE, THE GFCI PROTECTION SHALL BE PROVIDED WITH THE BREAKER SERVING THE DEVICE.
 - K. ALL GFCI RECEPTACLES SHALL HAVE AUTO-MONITORING / SELF-TEST FUNCTION AND REVERSE LINE-LOAD MISFIRE FUNCTION AND MEET ALL REQUIREMENTS OF UL 943 (LATEST EDITION).
6. **SUPPORTS:**
- A. ALL EQUIPMENT SHALL BE ADEQUATELY SUPPORTED FROM STRUCTURE.
 - B. INSERTS IN MASONRY SHALL BE LEAD OR FIBER IN DRILLED HOLES, OR CAST IN PLACE.
 - C. NAILS OR POWDER ACTUATED FASTENERS SHALL NOT BE USED.
 - D. EMT/MC/RGS SUPPORTS SHALL BE A MAXIMUM OF 8'-0" APART AND A MAXIMUM OF 3'-0" FROM BOXES.
 - E. LIGHTING FIXTURES MOUNTED IN OR ON CEILING SHALL BE SUPPORTED FROM STRUCTURE VIA 12 GAUGE STEEL WIRE. PROVIDE A MINIMUM OF FOUR WIRES, ONE ATTACHED TO EACH CORNER OF LAY-IN FIXTURES. RECESSED DOWNLIGHT FIXTURES SHALL BE SUPPORTED THE SAME. DO NOT SUPPORT RACEWAY OR FIXTURES FROM CEILING GRID OR DUCT WORK. USE U.L. LISTED GRID CLIPS ON ALL LAY-IN FIXTURES.
7. **PAINTING:**
- A. SUITABLE FINISH COAT SHALL BE PROVIDED FOR ALL EQUIPMENT, PANEL TUBS, COVERS, ETC. SHALL BE PRIMER AND ENAMELED TO BE COMPATIBLE WITH ADJACENT SURFACES, OR SHALL BE MANUFACTURER'S STANDARD COLOR BAKED ENAMEL FINISH, OR AS DIRECTED BY THE ARCHITECT.
8. **TELECOMMUNICATIONS:**

- A. FURNISH A COMPLETE TELEPHONE CONDUIT SYSTEM AS INDICATED ON THE DRAWINGS.
 - B. TELECOMMUNICATION OUTLETS SHALL CONSIST OF A 4" SQUARE DEEP BOX WITH SINGLE GANG PLASTER RING. PROVIDE BLANK PLATE WITH KNOCKOUTS FOR OUTLETS. ATTACH EMT WITH CONNECTORS HAVING GALVANIZED THROUGH HOLES. INSTALLER.
 - C. PROVIDE MINIMUM 1" RACEWAY, UNLESS OTHERWISE NOTED. FROM EACH BOX TO ABOVE NEAREST ACCESSIBLE CEILING SPACE FOR J-HOOK SYSTEM OR TO CABLE TRAY AS APPLICABLE. PROVIDE MINIMUM 210# TEST NYLON PULL CORD AND NYLON BUSHINGS IN ALL EMPTY RACEWAYS.
 - D. PROVIDE RACEWAYS FOR ALL EXTERIOR AND/OR EXPOSED LOCATIONS.
 - E. PROVIDE EQUAL ACCESSIBILITY FOR ALL TELEPHONE DATA SYSTEMS AND EQUIPMENT PER REQUIREMENTS AND SPECIFICATIONS PROVIDED BY THE OWNERS DESIGNATED VENDOR.
 - F. ALL LOW-VOLTAGE CABLING SHALL BE PLENUM-RATED.
9. **LIGHTING FIXTURES:**
- A. TYPES AND MANUFACTURERS ARE SCHEDULED ON THE PLANS. EQUIVALENT FIXTURES BY OTHERS MAY BE SUBMITTED ONLY AS INDICATED ON THE PLANS AND ARE SUBJECT TO THE APPROVAL OF THE OWNER AND ENGINEER.
 - B. ALL FIXTURES SHALL BE U.L. LISTED AND LABELED.
 - C. LAMPS SHALL BE GENERAL ELECTRIC, PHILIPS, OR OSRAM/PENNSYLVANIA EXCEPT WHERE OTHERWISE NOTED IN THE LIGHTING FIXTURE SCHEDULE OR OTHERWISE NOTED. ALL FIXTURES SHALL BE EQUIPPED WITH LAMPS.
 - D. BALLASTS SHALL BE AS INDICATED IN THE LIGHTING FIXTURE SCHEDULE OR AS OTHERWISE NOTED IN THE LIGHTING FIXTURE SCHEDULE OR OTHERWISE NOTED.
 - E. ALL FIXTURES SHALL BE PROVIDED FOR PROPER VOLTAGE BASED ON THE CIRCUIT ASSIGNMENT INDICATED ON THE PLANS.
 - F. PROVIDE CATALOG NUMBERS ARE FOR GENERAL IDENTIFICATION OF FIXTURES ONLY. ALL RELATED PARTS, SUCH AS PLASTER RINGS, JUNCTION BOXES, HOUSERS, SHIELDS, MOUNTING STEMS, CANOPIES, CONNECTORS, STRAPS, NIPPLES, LOWVARE, ACCESSORIES, ETC., TO FIT THEM PROPERLY TO THE CONSTRUCTION, SHALL BE PROVIDED BY THE MANUFACTURER OF THE FIXTURES. CONTRACTOR SHALL PROVIDE SUITABLE TRIM AND APPURTENANCES TO MOUNT FIXTURES IN TYPE OF CEILING OR WALL AS SPECIFIED IN ARCHITECTURAL FINISH SCHEDULES REGARDLESS OF CATALOG NUMBER GIVEN.
 - G. ALL FIXTURES SHALL BE GROUNDED PER THE NEC.
 - H. FIXTURES CONNECTED WITH FLEX TO THE RIGID RACEWAY PORTION OF THE WRING SYSTEM SHALL CARRY A GREEN BONDING JUMPER WITHIN THE FLEX. THE JUMPER SHALL BE FASTENED TO BOTH THE FIXTURE AND THE RACEWAY SYSTEM WITH A STEEL CITY "G" CLIP OR APPROVED EQUIVALENT. PHASE AND GROUND CONDUCTORS RUN IN FLEX SHALL BE #12 AWG MINIMUM. MAXIMUM FLEX LENGTH SHALL BE 6'-0".
 - I. SURFACE-MOUNTED FLUORESCENT FIXTURES INSTALLED ON COMBUSTIBLE MATERIAL SHALL BE MOUNTED AT LEAST 1/4" FROM THE SURFACE OF THE MATERIAL, EXCEPT FOR FIXTURES WHICH ARE PLAINLY MARKED AS U.L. APPROVED FOR MOUNTING DIRECTLY TO SUCH SURFACES.
 - J. MOUNT ALL FIXTURES PLUMB AND SQUARE WITH ROWS ALIGNED.
 - K. FLUORESCENT LUMINAIRES THAT UTILIZE DOUBLE-ENDED LAMPS AND CONTAIN BALLAST(S) THAT CAN BE SERVICED IN PLACE SHALL HAVE A DISCONNECTING MEANS WITHIN INTEGRAL OR EXTERNAL TO EACH LUMINAIRE PER NEC 410.130(C).
 - L. SEE ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATION OF FIXTURES.
 - M. CONTRACTOR SHALL COORDINATE FIXTURE TYPE AND TRIM WITH CEILING CONSTRUCTION AND ADJUST ACCORDINGLY WITHOUT ADDITIONAL EXPENSE.
 - N. ALL LIGHTING FIXTURES SHALL BE THERMALLY PROTECTED PER THE NEC.
10. **LIGHTING CONTROLS:**
- A. FURNISH AND INSTALL WHERE SHOWN AN ELECTRONIC TIME CONTROLLER AS MANUFACTURED BY TORK (NSI), PARAGON, INTERMATIC, OR APPROVED EQUAL. CONTACTS SHALL BE SPST OR AS INDICATED, RATED 120/277V AT 20A BALLAST LOAD, AND MINIMUM 30,000 SWITCHING CYCLES. PROVIDE WITH THE NUMBER OF CHANNELS, INDICATED (MINIMUM 2 CHANNELS) OR AS REQUIRED TO MEET THE INTENT OF THE DRAWINGS. EACH CHANNEL SHALL BE INDIVIDUALLY PROGRAMMABLE WITH 128 ON-OFF OPERATIONS PER WEEK PLUS FOUR SEASONAL SCHEDULES TO MODIFY THE BASIC PROGRAM AND A HOLIDAY SCHEDULE TO OVERRIDE THE WEEKLY OPERATION. THE CONTROLLER SHALL BE PROVIDED WITH A PHOTOELECTRIC SENSOR, ASTRONOMIC DIAL, AND A BATTERY BACKED-UP, NON-VOLITILE MEMORY FOR SCHEDULES AND TIME CLOCK.
 - B. LIGHTING CONTROLS SHALL SWITCH LOADS AT THE VOLTAGE AND AMPERE RATING INDICATED AND SHALL HAVE THE NUMBER OF POLES INDICATED ON THE DRAWINGS OR AS REQUIRED. THE CONTRACTOR AND CONTACTS SHALL BE CONTINUOUSLY RATED FOR THE LOAD SERVED, INCLUDING TUNGSTEN FILAMENT, INDUCTIVE, AND HIGH-INRUSH BALLAST LOADS.
 - C. ALL LIGHTING CONTACTORS SHALL BE ELECTRICALLY HELD AND BE INSTALLED IN A NEMA 1 ENCLOSURE, UNLESS OTHERWISE NOTED.
11. **EQUIPMENT IDENTIFICATION:**
- A. PROVIDE ENGRAVED PHENOLIC NAMEPLATES FOR ALL ELECTRICAL EQUIPMENT SUPPLIED FOR THE PROJECT, INCLUDING BUT NOT LIMITED TO, WIRING TROUGHS, SAFETY SWITCHES, DISCONNECTS, TRANSFORMERS, PANELBOARDS, ETC. NAMEPLATE SHALL INDICATE THE DEVICE NAME, SYSTEM VOLTAGE (VOLTAGE/PHASE/WRE), AND UPSTREAM DEVICE AND CIRCUIT. PROVIDE NAMEPLATES FOR CIRCUIT BREAKERS IN SWITCHGEARS, SWITCHBOARDS AND DISTRIBUTION PANELS.
 - B. NAMEPLATE COLORS SHALL BE AS FOLLOWS:

120/208V EQUIPMENT	BLUE SURFACE WITH WHITE CORE
277/480V EQUIPMENT	BLACK SURFACE WITH WHITE CORE
EMERGENCY SYSTEMS	GREEN SURFACE WITH WHITE CORE
FIRE ALARM SYSTEM	BRIGHT RED SURFACE WITH WHITE CORE
SECURITY SYSTEMS	BURGUNDY SURFACE WITH WHITE CORE
TELEPHONE SYSTEMS	ORANGE SURFACE WITH WHITE CORE
DATA SYSTEMS	BROWN SURFACE WITH WHITE CORE
PAGING SYSTEMS	PURPLE SURFACE WITH WHITE CORE
	WHITE SURFACE WITH BLACK CORE
 - C. NAMEPLATES UP TO 8 SQUARE INCHES SHALL NOT BE LESS THAN 1/16" THICK. NAMEPLATES LARGER THAN 8 SQUARE INCHES SHALL NOT BE LESS THAN 1/8" THICK.
 - D. LETTERING HEIGHT SHALL BE 1/2" MINIMUM.
 - E. NAMEPLATES SHALL BE ATTACHED WITH SELF-DRILLING/SELF-TAPPING SCREWS, EXCEPT RIVETS SHALL BE USED WHERE END OF SCREW IS NOT PROTECTED. QUANTITY AS FOLLOWS:

UP TO 5 SQUARE INCHES:	2 SCREWS.
5 TO 12 SQUARE INCHES:	4 SCREWS.
ABOVE 12 SQUARE INCHES:	6 SCREWS.
12. **DISCONNECTS:**
- A. DISCONNECT SWITCHES SHALL BE HEAVY-DUTY TYPE IN NEMA 1 ENCLOSURES, UNLESS OTHERWISE NOTED, FUSED OR NON-FUSED AS INDICATED. SWITCHES SHALL HAVE REJECTION-TYPE FUSE CLIPS. SWITCHES SHALL BE BY EATON, SQUARE-D, GENERAL ELECTRIC, OR APPROVED EQUAL. WHERE FED FROM A LOAD CENTER, GENERAL-DUTY SWITCHES SHALL BE PERMITTED.
 - B. FUSES LESS THAN 60A SHALL BE CLASS RK5, DUAL-ELEMENT, TIME-DELAY WITH INDICATION.
 - C. FUSES GREATER THAN 60A SHALL BE CLASS J, DUAL-ELEMENT, TIME-DELAY WITH INDICATION.
 - D. A SET OF 3 SPARE FUSES OF EACH SIZE AND TYPE SHALL BE FURNISHED TO THE OWNER.
13. **PANELBOARDS:**
- A. PANELBOARDS SHALL BE PROVIDED AS MANUFACTURED BY EATON, SQUARE-D, GENERAL ELECTRIC, OR APPROVED EQUAL. ALL NEW EQUIPMENT FOR THE PROJECT SHALL BE BY THE SAME MANUFACTURER. LOAD CENTER TYPE PANELBOARDS SHALL BE USED WHERE THE PANELBOARD SERVES A DWELLING UNIT.
 - B. ALL BUSSING, INCLUDING NEUTRAL AND GROUND, SHALL BE COPPER.
 - C. ALL BREAKERS SHALL BE AUTOMATIC THERMAL-MAGNETIC TYPE. LABELED CASE BOLT-ON TYPE, CALIBRATED FOR 40 DEGREE C, OR AMBIENT COMPENSATION, UNLESS OTHERWISE NOTED.
 - D. PANELS SHALL BE FULLY RATED (AIC), NO SERIES AIC RATINGS ARE ALLOWED.
 - E. PANELS SHALL HAVE FULL SIZE EQUIPMENT GROUNDING BARS AND NEUTRAL BARS, EXCEPT WHERE INDICATED TO BE 200K.
 - F. ALL PANELBOARD AND BREAKER LUGS SHALL BE SIZED AND RATED PER THE CONDUCTOR SIZE AND MATERIAL.
 - G. LIGHTING AND APPLIANCE PANELS (100A-600A) SHALL HAVE FRONT ACCESSIBLE HINGED DOOR-IN-DOOR COVERS WITH DEAD FRONT, SHALL BE 20" WIDE MINIMUM WITH MINIMUM 4" WIDE WIRING GUTTERS.
 - H. DISTRIBUTION PANELS (600A-1200A) SHALL HAVE FRONT ACCESSIBLE DEAD FRONT COVERS.
 - I. PROVIDE HANDLE LOCK-ON DEVICES FOR ALL CIRCUIT BREAKERS CONNECTED TO EMERGENCY EXIT, NIGHT LIGHTING, FIRE ALARM, TELEPHONE BOARDS, AND SECURITY SYSTEMS.
 - J. BREAKERS USED FOR SWITCHING SHALL BE SWITCHING DUTY (SWD) RATED.
 - K. BREAKERS USED FOR HEATING, AIR-CONDITIONING AND/OR REFRIGERATION SHALL BE HACR RATED.
 - L. GROUND-FAULT CIRCUIT-INTERRUPTER (GFCI) PROTECTION FOR PERSONNEL SHALL BE PROVIDED FOR ALL LOCATIONS PER NEC 210.8, INSTALLED IN A READILY ACCESSIBLE LOCATION. WHERE A DEVICE LOCATION IS NOT ACCESSIBLE, THE GFCI PROTECTION SHALL BE PROVIDED WITH THE BREAKER SERVING THE DEVICE.

- M. ARC-FAULT CIRCUIT-INTERRUPTER (AFCI) PROTECTION SHALL BE PROVIDED FOR ALL LOCATIONS PER NEC 210.12, INSTALLED IN A READILY ACCESSIBLE LOCATION. THIS INCLUDES ALL 120V, 15A AND 20A BRANCH CIRCUITS IN DWELLING UNITS, DORMITORY/STUDENT HOUSING UNITS AND HOTEL/MOTEL GUEST ROOMS/SUITES AS DEFINED BY THE ENGINEER. SYSTEM SHALL HAVE A 24HR MINIMUM BATTERY BACKUP. ALL FINAL CONNECTIONS, TESTING AND ADJUSTMENTS SHALL BE PERFORMED BY OR UNDER DIRECT SUPERVISION OF AN AUTHORIZED FACTORY REPRESENTATIVE. SYSTEM SHALL BE SIMPLE, NOTIFIER, SIEMENS, OR APPROVED EQUAL AS ACCEPTED BY THE ENGINEER. SYSTEM SHALL HAVE A 24HR MINIMUM BATTERY BACKUP. ALL FINAL CONNECTIONS, TESTING AND ADJUSTMENTS SHALL BE PERFORMED BY OR UNDER DIRECT SUPERVISION OF AN AUTHORIZED FACTORY REPRESENTATIVE. NEW DEVICES SHALL BE COMPATIBLE WITH THE EXISTING FIRE ALARM SYSTEM. THE CONTRACTOR SHALL FIELD VERIFY EXACT SYSTEM MANUFACTURER AND TYPE FOR ADEQUACY TO MEET THE INTENT INDICATED ON THE DRAWINGS.
 - O. INITIATING DEVICE ACTIVATION SHALL CAUSE OPERATION OF THE PROPER ALARM CIRCUIT IN THE CONTROL PANEL, AND OPERATE ALL AUDIBLE AND VISUAL ALARM INDICATORS. EACH AIR HANDLER UNIT SHALL BE PROVIDED WITH A SYSTEM CONTROLLED RELAY TO EFFECT SHUTDOWN. ALL ALARM DEVICES AND LAMPS SHALL BE PROGRAMMED TO OPERATE UNTIL THE INITIATING DEVICE IS RESET. SUBSEQUENT ALARMS SHALL RESOUND THE SYSTEM. AN AUDIBLE AND VISUAL SIGNAL SHALL INDICATE SYSTEM TROUBLE. THE CONTROL PANEL SHALL PROVIDE FOR ACTIVATING A UL LISTED CENTRAL STATION SIGNAL FOR NOTIFYING THE FIRE DEPARTMENT.
 - P. MANUAL STATIONS SHALL BE NON-CODED, WITH DUAL-ACTION PULL AND KEY TYPE RESET, SEMI-FLUSH MOUNTED. COMBINATION LIGHT AND HORN SIGNALS SHALL BE FLUSH MOUNTED. WIRING SHALL BE IN CONDUIT AS PREVIOUSLY SPECIFIED, #14 AWG MINIMUM, THHN. ALL J-BOXES USED FOR THE FIRE ALARM SYSTEM SHALL BE PAINTED RED.
 - Q. CONDUCTORS SHALL BE PLENUM-RATED AND INSTALLED IN CONDUIT AND INSTALLED IN COMPLIANCE WITH NFPA 70, ARTICLE 760, IN ADDITION TO WIRING METHODS 300.4.
 - R. ALL FIRE ALARM WIRING SHALL BE CLASS B.
 - S. PROVIDE ALL REQUIRED MODULES, POWER EXTENDERS, PROGRAMMING, ETC. FOR A COMPLETE AND OPERATIONAL SYSTEM.
 - T. SUBMIT FIRE ALARM SHOP DRAWINGS CONSISTING OF PRODUCT DATA, TO THE ENGINEER AND FOR APPROVAL.
 - U. FILL OUT NFPA 72 CERTIFICATION REPORT AND SUBMIT TO ENGINEER AND ARCHITECT.
 - V. WARRANTY ALL WORK PERFORMED AND ALL MATERIALS AND EQUIPMENT FURNISHED UNDER THIS CONTRACT SHALL BE FREE FROM DEFECTS AND SHALL REMAIN SO FOR A PERIOD OF AT LEAST TWO (2) YEARS FROM THE DATE OF ACCEPTANCE BY THE PROFESSIONAL ENGINEER AND/OR OWNER. THE FULL COST OF MAINTENANCE, LABOR, AND MATERIALS REQUIRED TO CORRECT ANY DEFECT DURING THIS TWO YEAR PERIOD SHALL BE IMMEDIATELY CORRECTED AT NO ADDITIONAL COST TO THE OWNER. ANY DEFECTS THAT RENDER THE SYSTEM INOPERATIVE SHALL BE REPAIRED WITHIN 24 HOURS OF THE OWNER NOTIFYING THE CONTRACTOR. OTHER DEFECTS SHALL BE REPAIRED WITHIN 48 HOURS OF THE OWNER NOTIFYING THE CONTRACTOR.
16. **FIRE STOPPING:**
- A. ALL PENETRATIONS OF RATED ASSEMBLIES SHALL BE SEALED WITH RATED MATERIALS MEETING ASTM E-814.
 - B. PROVIDE FIRESTOPPING DEVICE(S) OR SYSTEM(S) WHICH HAVE BEEN TESTED AND LISTED AS COMPLYING WITH ASTM E-814. INSTALL THE DEVICE(S) OR SYSTEM(S) IN ACCORDANCE WITH THE CONDITIONS OF THEIR LISTING. PROVIDE THE APPROPRIATE DEVICE(S) OR SYSTEM(S) WITH AN "F" RATING EQUAL TO THE RATING OF THE ASSEMBLY BEING PENETRATED.
 - C. DEVICE(S) AND/OR SYSTEM(S) SHALL BE BY HILT, 3M OR EQUIVALENT.
- ELECTRICAL COORDINATION WITH OTHER TRADES:**
- A. THE ELECTRICAL CONTRACTOR SHALL CONNECT AND/OR PROVIDE FINAL CONNECTIONS TO ALL EQUIPMENT SUPPLIED BY OTHERS APPLICABLE TO THE PROJECT, INCLUDING BUT NOT LIMITED TO, MECHANICAL, PLUMBING, FIRE PROTECTION AND SUPPRESSION, OWNER FURNISHED, KITCHEN, LABORATORY, ETC. UNLESS OTHERWISE NOTED.
 - B. THE ELECTRICAL CONTRACTOR SHALL COORDINATE ALL CONNECTIONS PRIOR TO ROUGH-IN USING APPROVED CATALOG SHEETS AND SHOP DRAWINGS.
 - C. THE ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL ALL MANUAL MOTOR STARTER SWITCHES, DISCONNECT SWITCH RECEPTACLES, ETC. TO MECHANICAL AND PLUMBING EQUIPMENT. ALL STARTERS, OTHER THAN MANUAL STARTER SWITCHES, SHALL BE PROVIDED BY OTHERS, BUT INSTALLED BY THE ELECTRICAL CONTRACTOR.
 - D. ALL DISCONNECT SWITCHES AND FUSE SIZES SHALL BE COORDINATED WITH SHOP DRAWINGS PRIOR TO ORDERING OR INSTALLING. ANY EQUIPMENT INSTALLED INCORRECTLY BECAUSE OF LACK OF COORDINATION WILL BE REMOVED AND REINSTALLED CORRECTLY AT THE EXPENSE OF THE ELECTRICAL CONTRACTOR.
 - E. THE ELECTRICAL CONTRACTOR SHALL COORDINATE ALL CONDUIT RUNS TO THE INSTALLATION.
 - F. ALL DUCT SMOKE DETECTORS SHALL BE PROVIDED AND CONNECTED BY THE ELECTRICAL CONTRACTOR, BUT INSTALLED BY THE MECHANICAL CONTRACTOR.



ARCHITECT / ENGINEER'S SEAL



BEAUFORT COUNTY ENGINEERING

BEAUFORT COUNTY DNA LABORATORY ADDITION

111 INDUSTRIAL VILLAGE RD
BEAUFORT, SC 29906

FOR CONSTRUCTION

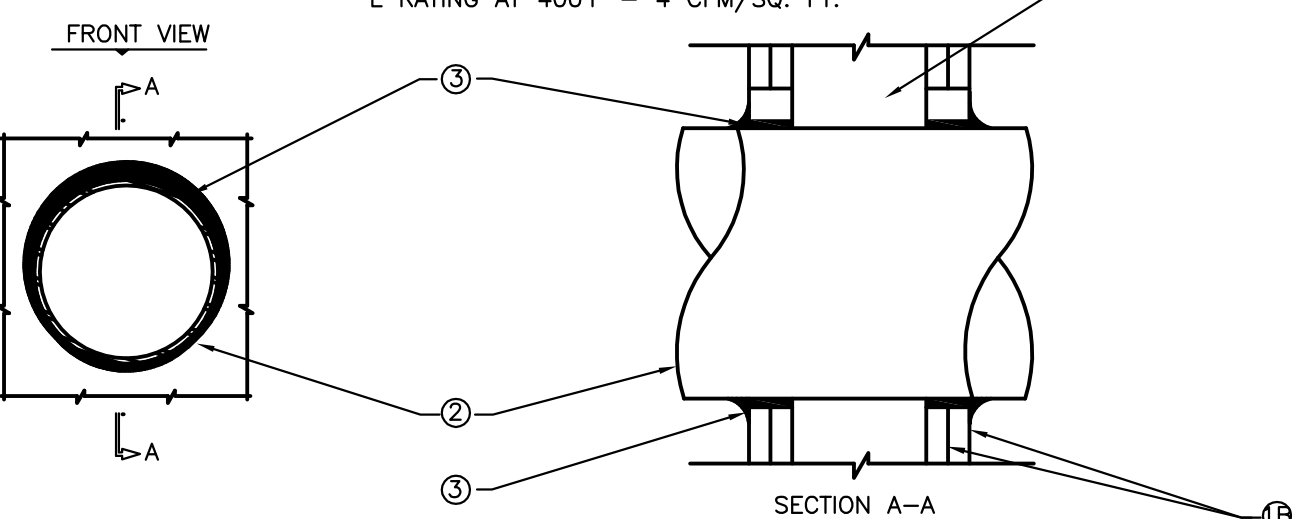
REVISIONS / SUBMISSIONS	
NO.	DESCRIPTION

SHEET INFORMATION	
DATE	APRIL 29, 2020
JOB NUMBER	19044.00
DRAWN	SKL
CHECKED	ZK
APPROVED	ZK

SPECIFICATIONS

E-002

UL SYSTEM NO. W-L-1085
 F RATING - 1-HR OR 2-HR (SEE ITEM 1B)
 T RATING - 0 HR
 L RATING AT AMBIENT - LESS THAN 1 CFM/SQ. FT.
 L RATING AT 400°F - 4 CFM/SQ. FT.



1. WALL ASSEMBLY - THE 1 OR 2 HR FIRE-RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED U300 OR U400 SERIES WALL AND PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:

A. STUDS - WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. LUMBER SPACED 16 IN. OC. STEEL STUDS TO BE MIN 2-1/2 IN. WIDE AND SPACED MAX 24 IN. OC.
 B. GYPSUM BOARD - 5/8 IN. THICK, 4 FT WIDE WITH SQUARE OR TAPERED EDGES. THE GYPSUM WALLBOARD TYPE, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL WALL AND PARTITION DESIGN. MAX DIA OF OPENING IS 1-1/2 IN.

DIA OF CIRCULAR OPENING CUT THROUGH GYPSUM WALLBOARD OF EACH SIDE OF WALL ASSEMBLY TO BE MIN 1/4 IN. TO MAX 1/2 IN. LARGER THAN OUTSIDE DIA OF THROUGH PENETRANT (ITEM 2). THE HOURLY F RATING OF THE FIRESTOP SYSTEM IS EQUAL TO THE HOURLY F RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED.

2. THROUGH PENETRANTS - ONE METALLIC PIPE, CONDUIT OR TUBING TO BE INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY. THE ANNULAR SPACE BETWEEN THE THROUGH-PENETRANT AND THE PERIPHERY OF THE OPENING SHALL BE MIN 0 IN. TO MAX 1/4 IN. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, CONDUITS OR TUBING MAY BE USED:

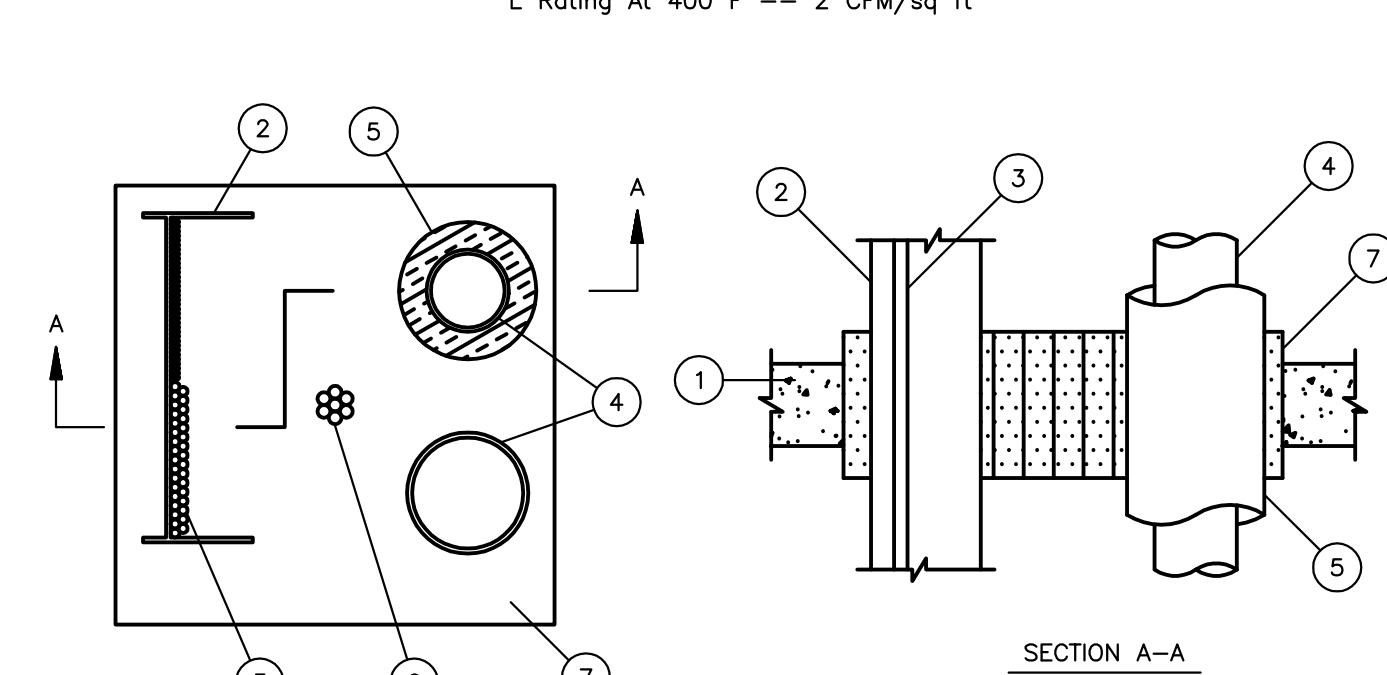
- A. STEEL PIPE - NOM 12 IN. DIA (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
- B. IRON PIPE - NOM 12 IN. DIA (OR SMALLER) CAST OR DUCTILE IRON PIPE.
- C. CONDUIT - NOM 6 IN. DIA (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR STEEL CONDUIT.
- D. COPPER TUBING - NOM 5 IN. DIA (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.
- E. COPPER TUBING - NOM 6 IN. DIA (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.

3. FILL VOID OR CAVITY MATERIAL - SEALANT - FILL MATERIAL TO BE FORCED INTO THE ANNULUS TO MAXIMUM EXTENT POSSIBLE. ADDITIONAL FILL MATERIAL TO BE INSTALLED SUCH THAT A MIN 1/2 IN. CROWN IS FORMED AROUND THE PENETRATING ITEM AND LAPPING 1/4 IN. BEYOND THE PERIPHERY OF THE OPENING.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. SEALSANT
 *BEARING THE UL CLASSIFICATION MARK

System No. C-AJ-8056

F Rating - 3 Hr
 T Rating - 0 Hr
 L Rating At Ambient - 5 CFM/Sq Ft
 L Rating At 400 F - 4 CFM/Sq Ft



1. FLOOR OR WALL ASSEMBLY - 4-1/2 IN. THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100-150 PCF) CONCRETE WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS*. MAX AREA OF OPENING IS 270 SQ. IN. WITH MAX DIMENSION OF 30 IN. SEE CONCRETE BLOCKS (CAZT) CATEGORY IN THE FIRE RESISTANCE DIRECTORY FOR NAMES OF MANUFACTURERS.
 2. CABLE TRAY* - MAX 18 IN. WIDE BY MAX 6 IN. DEEP OPEN-LADDER OR SOLID-BACK CABLE TRAY WITH CHANNEL-SHAPED SIDE RAILS FORMED OF 0.10 IN. THICK ALUMINUM OR 0.060 IN. THICK GALV STEEL TRAY AND WITH 1-1/2 IN. WIDE BY 1 IN. CHANNEL SHAPE RUNGS SPACED 9 IN. OC OR A 0.029 IN. THICK STEEL SOLID BACK, RESPECTIVELY. ONE CABLE TRAY TO BE INSTALLED IN THE OPENING. THE MAX ANNULAR SPACE BETWEEN THE CABLE TRAY IS 9 IN. AND BETWEEN THE PERIPHERY OF THE OPENING SHALL BE MIN 1-1/2 IN. TO MAX 4-1/2 IN. CABLE TRAY TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY.

3. CABLES - AGGREGATE CROSS-SECTIONAL AREA OF CABLES IN CABLE TRAY TO BE MAX 30 PERCENT OF THE CROSS-SECTIONAL AREA OF THE CABLE TRAY BASED ON A MAX 3 IN. CABLE LOADING DEPTH WITHIN THE CABLE TRAY. ANY COMBINATION OF THE FOLLOWING TYPES AND SIZES OF COPPER CONDUCTOR OR FIBER OPTIC CABLES MAY BE USED:

- A. 7/32 NO. 12 AWG WITH POLYVINYL CHLORIDE (PVC) INSULATION AND PVC JACKET.
- B. 300 PAIR - NO. 24 AWG CABLE WITH PVC INSULATION AND JACKET.
- C. 1/32, 500 KCMIL WITH CROSS-LINKED POLYETHYLENE (XLPE) INSULATION AND JACKET.
- D. 1/32, 500 KCMIL WITH THERMO PLASTIC INSULATION AND POLYVINYL CHLORIDE (PVC) JACKET.
- E. TWENTY FOUR FIBER OPTIC CABLE WITH PVC SUB UNIT AND JACKET.
- F. THROUGH-PENETRANTS - ONE OR MORE PIPE, CONDUIT OR TUBE TO BE INSTALLED WITHIN THE OPENING. THE TOTAL NUMBER OF THROUGH-PENETRANTS IS DEPENDENT ON THE SIZE OF THE OPENING AND TYPES AND SIZES OF THE PENETRANTS. ANY COMBINATION OF THE PENETRANTS DESCRIBED BELOW MAY BE USED PROVIDED THAT THE FOLLOWING PARAMETERS RELATIVE TO THE ANNULAR SPACES AND THE SPACING BETWEEN THE PIPES ARE MAINTAINED. THE SPACE BETWEEN PIPES, CONDUITS OR TUBE AND BETWEEN THE PERIPHERY OF THE OPENING AND THE PIPES OR CONDUITS SHALL BE MIN 1 IN. TO MAX 4-1/2 IN. FIRE, CONDUIT OR TUBE TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, CONDUITS OR TUBING MAY BE USED:

- A. NOM 6 IN. DIA (OR SMALLER) RIGID GALV STEEL CONDUIT.
- B. NOM 4 IN. DIA (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING.
- C. NOM 4 IN. DIA (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.
- D. NOM 4 IN. DIA (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBE.
- E. NOM 6 IN. DIA (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
- F. NOM 6 IN. DIA (OR SMALLER) CAST OR DUCTILE IRON PIPE.
- G. 1/2" DIA (OR SMALLER) THICK HOLLOW CYLINDRICAL HEAVY DENSITY (MIN 3.5 PCF) GLASS FIBER UNITS JACKETED ON THE OUTSIDE WITH AN ALL SERVICE JACKET. LONGITUDINAL JOINTS SEALED WITH METAL FASTENERS OR FACTORY APPLIED SELF-SEALING LAP TAPE. TRANSVERSE JOINTS SEALED WITH METAL FASTENERS OR WITH BUTT TAPE SUPPLIED WITH THE PRODUCT.

SEE PIPE AND EQUIPMENT COVERING AND MATERIALS (BROU) CATEGORY IN THE BUILDING MATERIALS DIRECTORY FOR NAMES OF MANUFACTURERS. ANY PIPE COVERING MEETING THE ABOVE SPECIFICATIONS AND BEARING THE UL CLASSIFICATION MARKING WITH A FLAME SPREAD INDEX OF 25 OR LESS AND A SMOKE DEVELOPED INDEX OF 50 MAY BE USED.

4. THROUGH-PENETRANTS - ONE OR MORE PIPE, CONDUIT OR TUBE TO BE INSTALLED WITHIN THE OPENING. THE TOTAL NUMBER OF THROUGH-PENETRANTS IS DEPENDENT ON THE SIZE OF THE OPENING AND TYPES AND SIZES OF THE PENETRANTS. ANY COMBINATION OF THE PENETRANTS DESCRIBED BELOW MAY BE USED PROVIDED THAT THE FOLLOWING PARAMETERS RELATIVE TO THE ANNULAR SPACES AND THE SPACING BETWEEN THE PIPES ARE MAINTAINED. THE SPACE BETWEEN THE PIPE OR TUBE AND BETWEEN THE PERIPHERY OF THE OPENING SHALL BE MIN 1-1/2 IN. TO MAX 9-1/4 IN. (235 MM) DIA (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR 6 IN. (152 MM) DIA STEEL CONDUIT.

- A. POLYVINYL CHLORIDE (PVC) PIPE - MAX 3 IN. (76 MM) DIA SCHEDULE 40 SOLID CORE PVC PIPE (OR SMALLER) FOR USE IN CLOSED (PROCESS OR SUPPLY) OR VENTED (DRAIN, WASTE OR VENT) PIPING SYSTEM.
- B. STEEL PIPE - NOM 6 IN. (152 MM) DIA (OR SMALLER) SCHEDULE 40 (OR HEAVIER) STEEL PIPE.
- C. CONDUIT - NOM 4 IN. (102 MM) DIA (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR 6 IN. (152 MM) DIA STEEL CONDUIT.
- D. COPPER PIPE - NOM 4 IN. (102 MM) DIA (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.
- E. COPPER TUBE - NOM 4 IN. (102 MM) DIA (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBE.
- F. PIPE COVERING - NOM 1-1/2 IN. THICK HOLLOW CYLINDRICAL HEAVY DENSITY (MIN 3.5 PCF) GLASS FIBER UNITS JACKETED ON THE OUTSIDE WITH AN ALL SERVICE JACKET. LONGITUDINAL JOINTS SEALED WITH METAL FASTENERS OR FACTORY APPLIED SELF-SEALING LAP TAPE. TRANSVERSE JOINTS SEALED WITH METAL FASTENERS OR WITH BUTT TAPE SUPPLIED WITH THE PRODUCT.

SEE PIPE AND EQUIPMENT COVERING AND MATERIALS (BROU) CATEGORY IN THE BUILDING MATERIALS DIRECTORY FOR NAMES OF MANUFACTURERS. ANY PIPE COVERING MEETING THE ABOVE SPECIFICATIONS AND BEARING THE UL CLASSIFICATION MARKING WITH A FLAME SPREAD INDEX OF 25 OR LESS AND A SMOKE DEVELOPED INDEX OF 50 MAY BE USED.

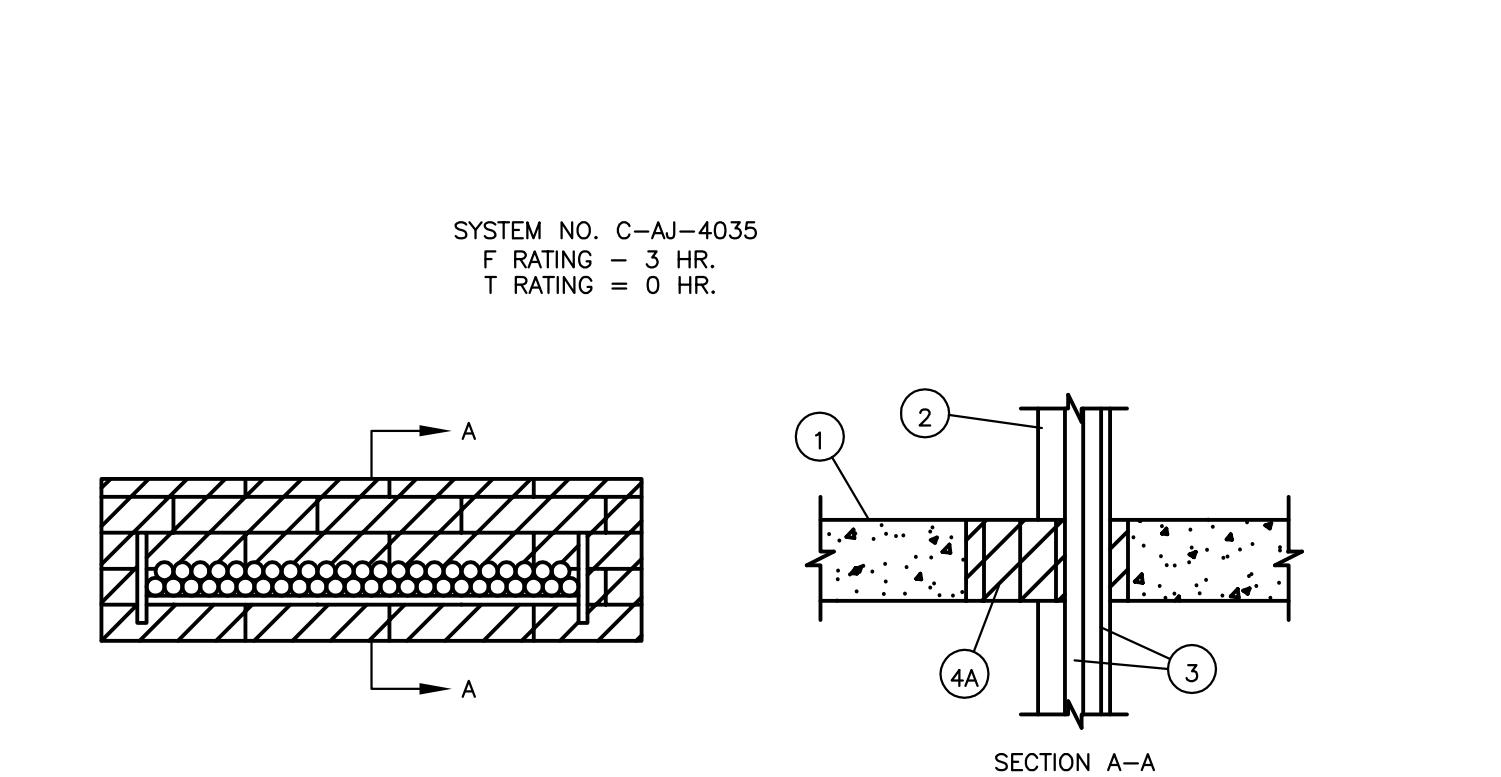
5. CABLES - MAX 1/2 IN. (12.7 MM) DIA TIGHT BUNDLE OF CABLES INSTALLED WITHIN THE OPENING AND RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR AND WALL. ANY COMBINATION OF THE FOLLOWING TYPES AND SIZES OF CABLES MAY BE USED:

- A. 7/32 NO. 12 AWG WITH POLYVINYL CHLORIDE (PVC) INSULATION AND PVC JACKET.
- B. 125 PAIR - NO. 24 AWG CABLE WITH PVC INSULATION AND JACKET.
- C. 2/C NO. 10 AWG WITH PVC INSULATION AND JACKET.
- D. 3/C NO. 8 AWG ALUMINUM CLAD CABLE WITH CROSS-LINKED POLYETHYLENE (XLPE) INSULATION AND PVC JACKET.
- E. TYPE RC - 62 A/U COAXIAL CABLE WITH AIR CORE AND PVC JACKET.
- F. 24 FIBER OPTIC CABLE WITH PVC SUB UNIT AND OUTER JACKET.

6. FIRESTOP SYSTEM - THE FIRESTOP SYSTEM SHALL CONSIST OF THE FOLLOWING:

- A. FILL VOID OR CAVITY MATERIAL* - FIRE BLOCKS INSTALLED WITH LONG DIMENSION PASSING THROUGH THE OPENING EXTENDING MIN 1-1/2 IN. FROM EACH SURFACE. BLOCKS TO COMPLETELY FIT THE ENTIRE OPENING.
- B. HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. - FS-ONE SEALANT
- C. WIRE MESH (NOT SHOWN) - WHEN THE ANNULAR SPACE EXCEEDS 4-1/2 IN. TO THE PERIPHERY, A NOM 2 IN. SQ WIRE FENCING SHALL BE USED TO KEEP THE FIRE BLOCKS IN PLACE. THE WIRE FENCING IS FABRICATED FROM MIN 18 SWG (0.060 IN.) THICK GALV STEEL WIRE. THE WIRE IS CUT TO FIT THE CONTOUR OF THE PENETRATING ITEM WITH A MIN 3 IN. LAP BEYOND THE PERIPHERY OF THE OPENING. WIRE FENCING SECURED TO TOP SURFACE OF FLOOR AND BOTH SURFACES OF WALL ASSEMBLY WITH MEANS OF 1/4 IN. DIA BY 1 IN. LONG CONCRETE TO ANCHORS OF 1/4 IN. BY 1-1/2 IN. DIA FENDER WASHERS SPACED MAX 8 IN. OC.

*BEARING THE UL CLASSIFICATION MARK



1. FLOOR OR WALL ASSEMBLY MIN 4-1/2 IN. THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100-150 PCF) OR 1600-2400 KG/M3 CONCRETE. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS*. MAX AREA OF OPENING IS 270 SQ. IN. WITH MAX DIMENSION OF 30 IN. SEE CONCRETE BLOCKS (CAZT) CATEGORY IN THE FIRE RESISTANCE DIRECTORY FOR NAMES OF MANUFACTURERS.

2. CABLE TRAY* - MAX 24 IN. WIDE BY MAX 4 IN. DEEP OPEN-LADDER OR SOLID-BACK CABLE TRAY WITH CHANNEL-SHAPED SIDE RAILS FORMED OF 0.10 IN. THICK ALUMINUM OR 0.060 IN. THICK GALV STEEL TRAY AND WITH 1-1/2 IN. WIDE BY 1 IN. CHANNEL SHAPE RUNGS SPACED 9 IN. OC OR A 0.029 IN. THICK STEEL SOLID BACK, RESPECTIVELY. THE ANNULAR SPACE BETWEEN THE CABLE TRAY AND THE PERIPHERY OF THE OPENING SHALL BE MIN 1 IN. TO MAX 4 IN. CABLE TRAY TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY.

3. CABLES AGGREGATE CROSS-SECTIONAL AREA OF CABLES IN CABLE TRAY TO BE MAX 40 PERCENT OF THE CROSS-SECTIONAL AREA OF THE CABLE TRAY. ANY COMBINATION OF THE FOLLOWING TYPES AND SIZES OF COPPER CONDUCTOR OR FIBER OPTIC CABLES MAY BE USED:

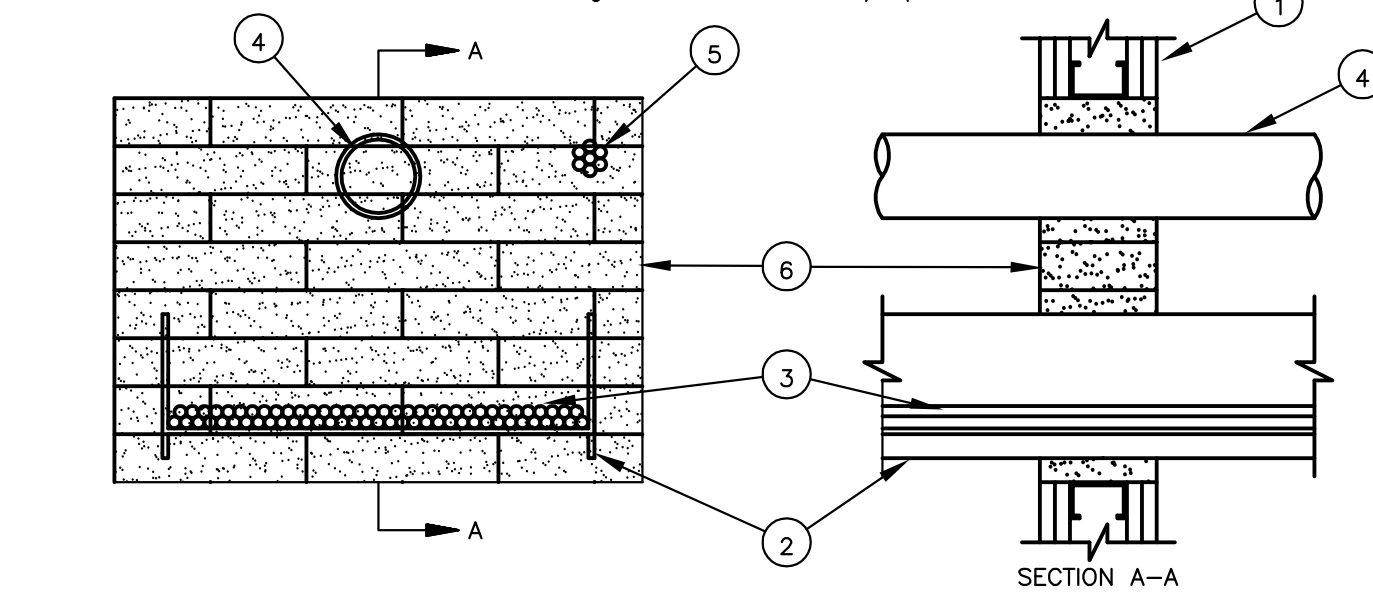
- A. 1/32, 500 KCMIL WITH THERMOPLASTIC INSULATION AND PVC JACKET.
- B. 300 PAIR - NO. 24 AWG CABLE WITH PVC INSULATION AND JACKET.
- C. 24 FIBER OPTIC CABLE WITH PVC SUBUNIT AND JACKET.
- D. THREE 1/2 NO. 12 AWG WIRE, INSULATED WITH POLYVINYL CHLORIDE, IN A NOMINAL 3/4 IN. FLEXIBLE METAL CONDUIT.
- E. FIRESTOP SYSTEM THE FIRESTOP SYSTEM SHALL CONSIST OF THE FOLLOWING:
- F. FILL VOID OR CAVITY MATERIAL* - SEALANT - FILL MATERIAL TO BE FORCED INTO INTERSTICES OF CABLES AND BETWEEN CABLES AND CABLE TRAYS TO MAX EXTENT POSSIBLE ON BOTH SURFACES OF THE PENETRATION.
- G. HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. - FS-ONE SEALANT
- H. WIRE MESH (NOT SHOWN) - WHEN THE ANNULAR SPACE EXCEEDS 4-1/2 IN. TO THE PERIPHERY, A NOM 2 IN. SQ WIRE FENCING SHALL BE USED TO KEEP THE FIRE BLOCKS IN PLACE. THE WIRE FENCING IS FABRICATED FROM MIN 18 SWG (0.060 IN.) THICK GALV STEEL WIRE. THE WIRE IS CUT TO FIT THE CONTOUR OF THE PENETRATING ITEM WITH A MIN 3 IN. LAP BEYOND THE PERIPHERY OF THE OPENING. WIRE FENCING SECURED TO TOP SURFACE OF FLOOR AND BOTH SURFACES OF WALL ASSEMBLY WITH MEANS OF 1/4 IN. DIA BY 1 IN. LONG CONCRETE TO ANCHORS OF 1/4 IN. BY 1-1/2 IN. DIA FENDER WASHERS SPACED MAX 8 IN. OC.

*BEARING THE UL CLASSIFICATION MARK

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. SEALSANT
 *BEARING THE UL CLASSIFICATION MARK

HILTI FIRESTOP SYSTEMS
 DRAWING ORIGINATION DATE: 03-21, 2011
 REPRODUCED BY HILTI, INC. COURTESY OF UNDERWRITERS LABORATORIES, INC.

System No. W-L-8013
 F Rating - 2 Hr (See Item 1)
 T Rating - 0 Hr
 L Rating At Ambient - 5 CFM/Sq Ft
 L Rating At 400 F - 2 CFM/Sq Ft



1. WALL ASSEMBLY - THE 1 OR 2 HR FIRE-RATED GYPSUM BOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES WALL AND PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:

A. STUDS - WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. (51 MM) LUMBER SPACED 16 IN. (406 MM) OC. STEEL STUDS TO BE MIN 2-1/2 IN. (64 MM) WIDE AND SPACED MAX 24 IN. (610 MM) OC. ADDITIONAL STUDS INSTALLED TO COMPLETELY FRAME THE OPENING.

B. GYPSUM BOARD* - 5/8 IN. (16 MM) THICK, 4 FT (1219 MM) WIDE WITH SQUARE OR TAPERED EDGES. THE GYPSUM BOARD TYPE, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL WALL AND PARTITION DESIGN. MAX AREA OF OPENING IS 1-1/2 IN. (38 MM) DIA WITH MAX DIMENSION OF 22 IN. (559 MM) WIDE.

C. CABLE TRAY - MAX 18 IN. (457 MM) WIDE BY MAX 6 IN. (152 MM) DEEP OPEN-LADDER OR SOLID-BACK CABLE TRAY WITH CHANNEL-SHAPED SIDE RAILS FORMED OF 0.085 IN. (1.65 MM) THICK ALUMINUM OR 0.060 IN. (1.52 MM) THICK STEEL AND WITH 1-1/2 IN. (38 MM) WIDE BY 1 IN. (25 MM) CHANNEL SHAPE RUNGS SPACED 9 IN. (229 MM) OC OR A 0.029 IN. (0.74 MM) THICK STEEL SOLID BACK, RESPECTIVELY. ONE CABLE TRAY TO BE INSTALLED IN THE OPENING. THE MAX ANNULAR SPACE BETWEEN THE CABLE TRAY AND THE PERIPHERY OF THE OPENING SHALL BE MIN 1-1/2 IN. TO MAX 4-1/2 IN. CABLE TRAY TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY.

3. CABLES - AGGREGATE CROSS-SECTIONAL AREA OF CABLES IN CABLE TRAY TO BE MAX 30 PERCENT OF THE CROSS-SECTIONAL AREA OF THE CABLE TRAY. ANY COMBINATION OF THE FOLLOWING TYPES AND SIZES OF COPPER CONDUCTOR CABLES MAY BE USED:

- A. 7/32 NO. 12 AWG WITH POLYVINYL CHLORIDE (PVC) INSULATION AND PVC JACKET.
- B. 100 PAIR - NO. 24 AWG CABLE WITH PVC INSULATION AND JACKET.
- C. 1/32, 750 KCMIL WITH THERMOPLASTIC INSULATION AND PVC JACKET.
- D. THROUGH-PENETRANTS - ONE OR MORE PIPE OR TUBE TO BE INSTALLED WITHIN THE OPENING. THE TOTAL NUMBER OF THROUGH-PENETRANTS IS DEPENDENT ON THE SIZE OF THE OPENING AND TYPES AND SIZES OF THE PENETRANTS. ANY COMBINATION OF THE PENETRANTS DESCRIBED BELOW MAY BE USED PROVIDED THAT THE FOLLOWING PARAMETERS RELATIVE TO THE ANNULAR SPACES AND THE SPACING BETWEEN THE PIPES ARE MAINTAINED. THE SPACE BETWEEN THE PIPE OR TUBE AND BETWEEN THE PERIPHERY OF THE OPENING SHALL BE MIN 1-1/2 IN. TO MAX 9-1/4 IN. (235 MM) DIA (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR 6 IN. (152 MM) DIA STEEL CONDUIT.
- E. COPPER PIPE - NOM 4 IN. (102 MM) DIA (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.
- F. COPPER TUBE - NOM 4 IN. (102 MM) DIA (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBE.
- G. PIPE COVERING - NOM 1-1/2 IN. THICK HOLLOW CYLINDRICAL HEAVY DENSITY (MIN 3.5 PCF) GLASS FIBER UNITS JACKETED ON THE OUTSIDE WITH AN ALL SERVICE JACKET. LONGITUDINAL JOINTS SEALED WITH METAL FASTENERS OR FACTORY APPLIED SELF-SEALING LAP TAPE. TRANSVERSE JOINTS SEALED WITH METAL FASTENERS OR WITH BUTT TAPE SUPPLIED WITH THE PRODUCT.

SEE PIPE AND EQUIPMENT COVERING AND MATERIALS (BROU) CATEGORY IN THE BUILDING MATERIALS DIRECTORY FOR NAMES OF MANUFACTURERS. ANY PIPE COVERING MEETING THE ABOVE SPECIFICATIONS AND BEARING THE UL CLASSIFICATION MARKING WITH A FLAME SPREAD INDEX OF 25 OR LESS AND A SMOKE DEVELOPED INDEX OF 50 MAY BE USED.

4. THROUGH-PENETRANTS - ONE OR MORE PIPE OR TUBE TO BE INSTALLED WITHIN THE OPENING. THE TOTAL NUMBER OF THROUGH-PENETRANTS IS DEPENDENT ON THE SIZE OF THE OPENING AND TYPES AND SIZES OF THE PENETRANTS. ANY COMBINATION OF THE PENETRANTS DESCRIBED BELOW MAY BE USED PROVIDED THAT THE FOLLOWING PARAMETERS RELATIVE TO THE ANNULAR SPACES AND THE SPACING BETWEEN THE PIPES ARE MAINTAINED. THE SPACE BETWEEN THE PIPE OR TUBE AND BETWEEN THE PERIPHERY OF THE OPENING SHALL BE MIN 1-1/2 IN. TO MAX 9-1/4 IN. (235 MM) DIA (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR 6 IN. (152 MM) DIA STEEL CONDUIT.

5. CABLES - MAX 1-1/2 IN. (38 MM) DIA TIGHT BUNDLE OF CABLES INSTALLED WITHIN THE OPENING AND RIGIDLY SUPPORTED ON BOTH SURFACES OF WALL. THE SPACE BETWEEN THE CABLES AND PERIPHERY OF THE OPENING SHALL RANGE FROM 1-1/2 IN. (38.2 MM) MIN TO A MAX OF 1-1/2 IN. (38 MM). ANY COMBINATION OF THE FOLLOWING TYPES AND SIZES OF CABLES MAY BE USED:

- A. 7/32 NO. 12 AWG WITH POLYVINYL CHLORIDE (PVC) INSULATION AND PVC JACKET.
- B. 25 PAIR - NO. 24 AWG CABLE WITH PVC INSULATION AND JACKET.
- C. TYPE RC U/S COAXIAL CABLE WITH PVC OUTER JACKET.
- D. 24 FIBER OPTIC CABLE WITH PVC SUB UNIT AND OUTER JACKET.
- E. FIRESTOP SYSTEM - THE FIRESTOP SYSTEM SHALL CONSIST OF THE FOLLOWING:

- A. FILL VOID OR CAVITY MATERIAL* - FIRE BLOCKS FOR WALLS INCORPORATING MAX 3-5/8 IN. (92 MM) STEEL STUDS OR MAX 2 (51 MM) DIA (OR SMALLER) WOOD STUDS. FIRE BLOCK INSTALLED WITH 5 IN. (127 MM) DIMENSION PROJECTING THROUGH AND CENTERED IN OPENING. FOR WALLS CONSTRUCTED OF LARGER STEEL OR WOOD STUDS, FIRE BLOCK INSTALLED WITH LONG DIMENSION PASSING THROUGH AND CENTERED IN OPENING. BLOCKS MAY OR MAY NOT BE CUT FLUSH WITH BOTH SURFACES OF WALL. WHEN MULTIPLE LAYERS OF GYPSUM BOARD ARE USED, BLOCKS MAY BE RECESSED 1/2 IN. (13 MM) FROM SURFACE OF WALL.
- HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. - FS 657 FIRE BLOCK
- F. FILL VOID OR CAVITY MATERIAL* - SEALANT - FILL MATERIAL TO BE FORCED INTO INTERSTICES OF CABLES, BETWEEN CABLES AND CABLE TRAYS, AROUND EACH PENETRANT AND WHERE OBVIOUS VOIDS ARE OBSERVED TO MAX EXTENT POSSIBLE ON BOTH SURFACES OF THE PENETRANT.
- HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. - FS-ONE SEALANT OR CP618 PUTTY STICK OR CP620 FIRE FOAM

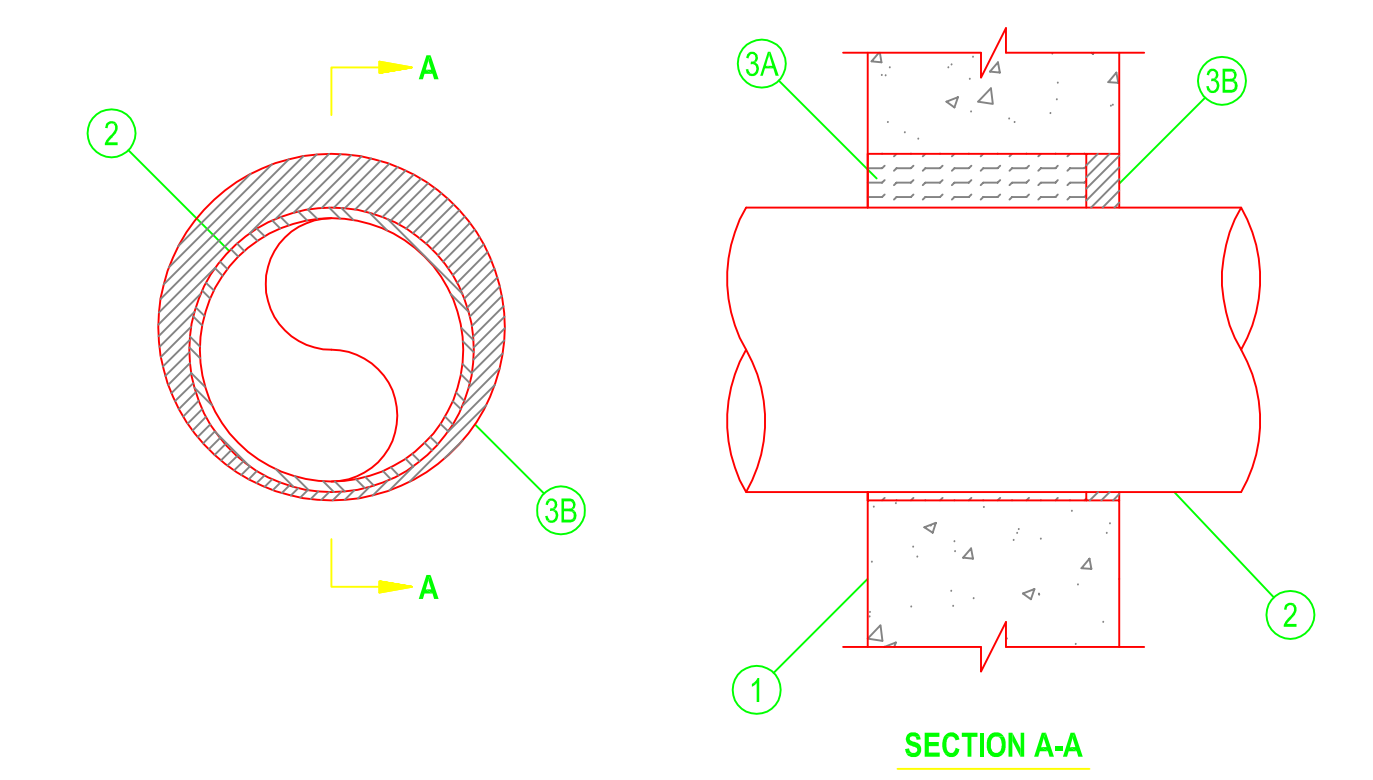
*BEARING THE UL CLASSIFICATION MARK

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. SEALSANT
 *BEARING THE UL CLASSIFICATION MARK

HILTI FIRESTOP SYSTEMS
 REPRODUCED BY HILTI, INC. COURTESY OF UNDERWRITERS LABORATORIES, INC.

SYSTEM NO. W-J-1088

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F RATING - 1 AND 2 HR (SEE ITEM 3)	F RATING - 1 AND 2 HR (SEE ITEM 3)
T RATING - 0 HR	FT RATING - 0 HR
	FH RATING - 1 AND 2 HR (SEE ITEM 3)
	FTH RATING - 0 HR



1. WALL ASSEMBLY - MIN 3-3/4 IN. (95 MM) THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100-150 PCF OR 1600-2400 KG/M3) CONCRETE. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS*. MAX DIAMETER OF OPENING 10-1/2 IN. (267 MM). SEE CONCRETE BLOCKS (CAZT) CATEGORY IN THE FIRE RESISTANCE DIRECTORY FOR NAMES OF MANUFACTURERS.

2. THROUGH-PENETRANTS - ONE METALLIC PIPE, CONDUIT OR TUBING TO BE INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, CONDUITS OR TUBING MAY BE USED:

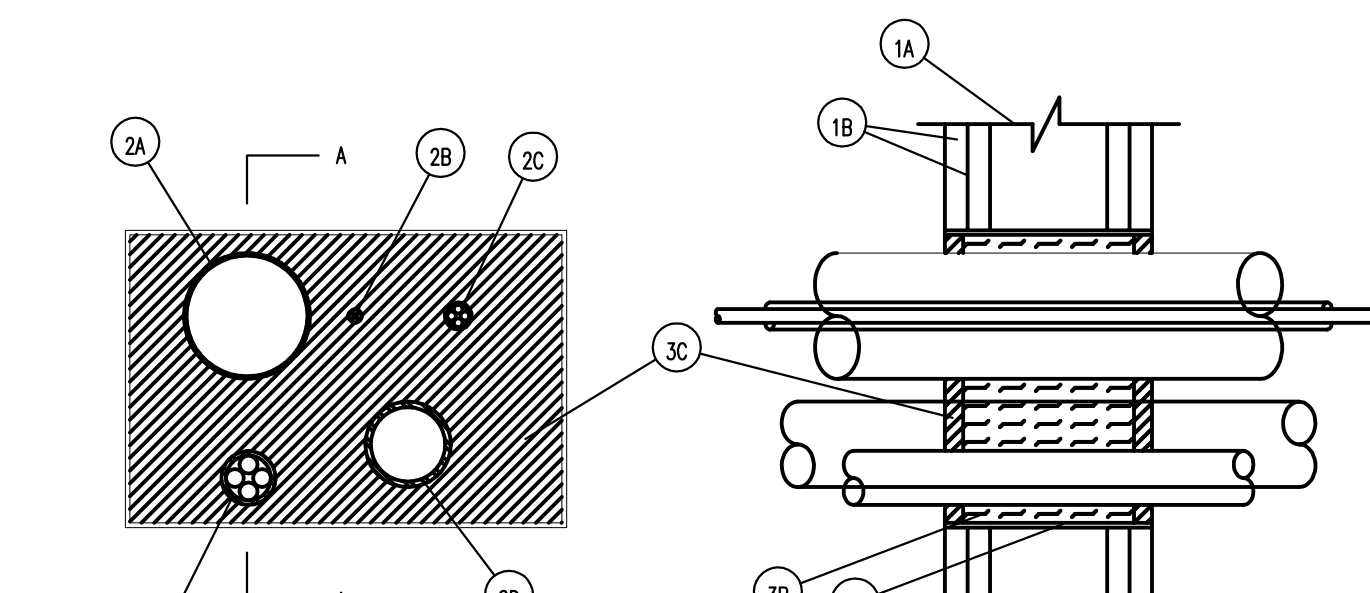
- A. STEEL PIPE - NOM 8 IN. (203 MM) DIA (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
- B. IRON PIPE - NOM 8 IN. (203 MM) DIA (OR SMALLER) CAST OR DUCTILE IRON PIPE.
- C. CONDUIT - NOM 4 IN. (102 MM) DIA (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING (EMT) OR 6 IN. DIA STEEL CONDUIT.
- D. COPPER TUBING - NOM 4 IN. (102 MM) DIA (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.
- E. COPPER PIPE - NOM 4 IN. (102 MM) DIA (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.
- F. FLEXIBLE STEEL CONDUIT - NOM 2 IN. (51 MM) DIA (OR SMALLER) FLEXIBLE STEEL CONDUIT.
- G. SEE FLEXIBLE METAL CONDUIT (DMX2) CATEGORY IN THE ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY FOR NAMES OF MANUFACTURERS.

*BEARING THE UL CLASSIFICATION MARK

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. SEALSANT
 *BEARING THE UL CLASSIFICATION MARK

HILTI FIRESTOP SYSTEMS
 REPRODUCED BY HILTI, INC. COURTESY OF UNDERWRITERS LABORATORIES, INC.

System No. W-L-8004
 F Rating - 2 Hr
 T Rating - 1/4 Hr



1. WALL ASSEMBLY THE FIRE-RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES WALL AND PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:

A. STUDS - WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. LUMBER SPACED 16 IN. OC. STEEL STUDS TO BE MIN 2-1/2 IN. WIDE AND SPACED MAX 24 IN. OC. ADDITIONAL FRAMING (NOT SHOWN) MAY BE INSTALLED AROUND THE PERIMETER OF THE OPENING IN LIEU OF THE STEEL WIRE MESH (ITEM 3A).

B. GYPSUM BOARD* - TWO LAYERS OF NOM 5/8 IN. THICK GYPSUM WALLBOARD, AS SPECIFIED IN THE INDIVIDUAL WALL AND PARTITION DESIGN. MAX AREA OF OPENING IS 96 SQ. IN. WITH MAX DIMENSION OF 12 IN. MAX WIDTH OF OPENING IN WOOD STUD WALLS IS LIMITED TO 12 IN.

2. THROUGH PENETRANTS THE FOLLOWING TYPES AND SIZES OF PIPES, CONDUITS, TUBING OR CABLES MAY BE USED:

- A. NOM 3 IN. DIA (OR SMALLER) ELECTRICAL METALLIC TUBING (EMT).
- B. MAX 25 PAIR - NO. 24 AWG (OR SMALLER) TELEPHONE CABLE WITH POLYVINYL CHLORIDE (PVC) INSULATION AND JACKET.
- C. MAX 3/8" WITH GROUND - NO. 10 AWG (OR SMALLER) TYPE NM CABLE WITH PVC INSULATION AND JACKET.
- D. NOM 2 IN. DIA (OR SMALLER) SCHEDULE 40 PVC PIPE FOR USE IN CLOSED (PROCESS OR SUPPLY) PIPING SYSTEMS ONLY.
- E. MAX 300 KCMIL (OR SMALLER) POWER CABLE WITH PVC INSULATION AND NYLON JACKET. THE THROUGH PENETRATING ITEMS TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY AND LOCATED AS SHOWN IN THE TABLE BELOW:

ITEM NO.	DISTANCE BETWEEN ADJACENT PEN. ITEM IN.	DISTANCE FROM ADJACENT THROUGH OPENING IN.	DISTANCE THROUGH OPENING IN.
2A	7-7/16	1-11/16	7-7/16
2B	7-7/16	1-11/16	7-7/16
2C	7-7/16	1-11/16	7-7/16
2D	7-7/16	1-11/16	7-7/16
2E	7-7/16	1-11/16	7-7/16

3. FIRESTOP SYSTEM THE FIRESTOP SYSTEM SHALL CONSIST OF THE FOLLOWING:

- A. STEEL WIRE MESH - NOM 8 STEEL WIRE MESH HAVING A MIN 1 IN. LAP ALONG THE LONGITUDINAL SEAM. LENGTH OF STEEL WIRE MESH TO BE 4-3/4 IN., CENTERED AND FORMED TO FIT PERIPHERY OF THROUGH OPENING. STEEL WIRE MESH IS NOT REQUIRED WHEN ADDITIONAL FRAMING MEMBERS (ITEM NO. 1A) ARE USED.
- B. PACKING MATERIAL MIN 4.0 IN. THICKNESS OF MIN 3.5 PCF MINERAL WOOL BATT INSULATION FIRMLY PACKED INTO OPENING AS A PERMANENT FORM. PACKING MATERIAL TO BE RECESSED FROM BOTH SURFACES OF WALL AS REQUIRED TO ACCOMMODATE THE REQUIRED THICKNESS OF FILL MATERIAL.
- C. FILL VOID OR CAVITY MATERIAL* - SEALANT MIN 1/2 IN. THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH BOTH SURFACES OF WALL.

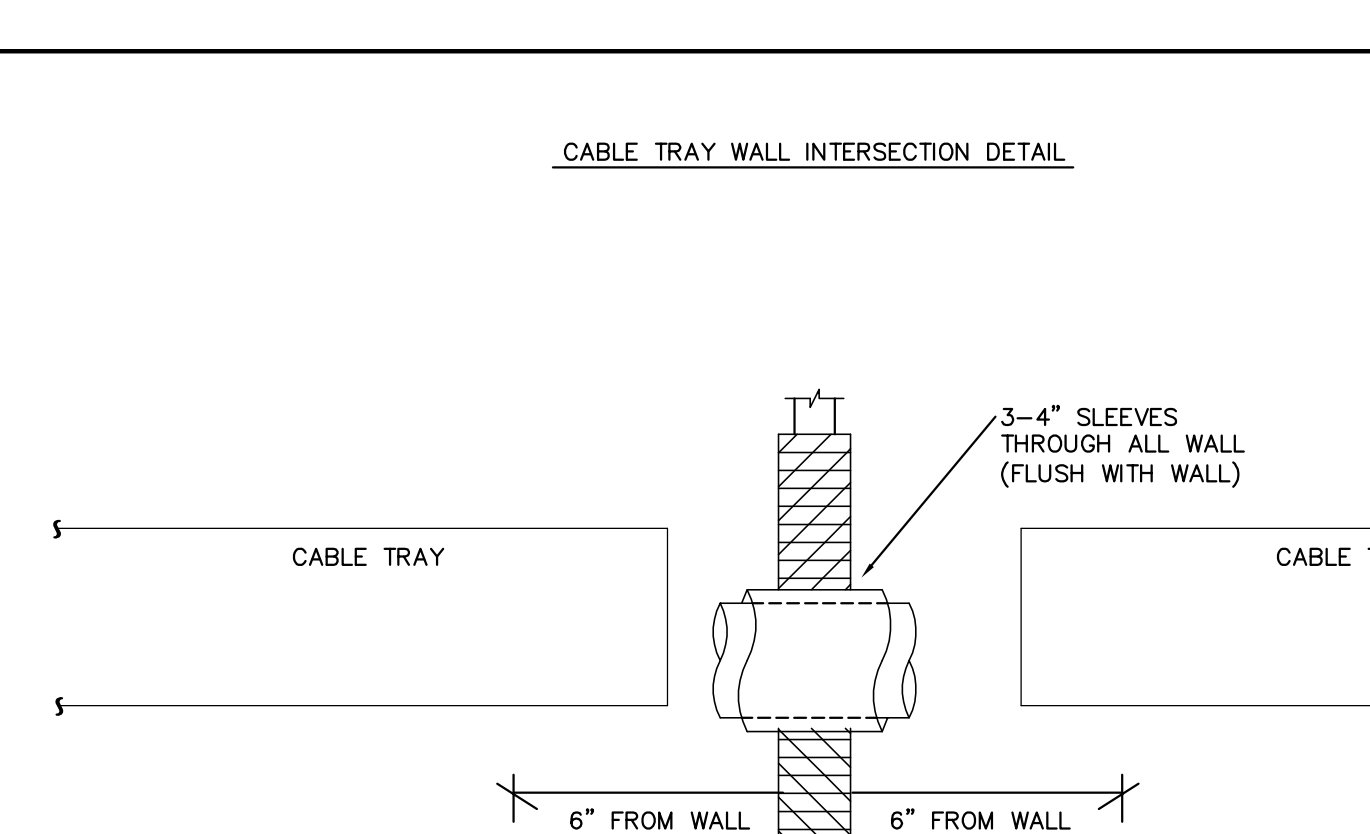
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. - FS-ONE SEALANT
 *BEARING THE UL CLASSIFICATION MARK

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. SEALSANT
 *BEARING THE UL CLASSIFICATION MARK

HILTI FIRESTOP SYSTEMS
 REPRODUCED BY HILTI, INC. COURTESY OF UNDERWRITERS LABORATORIES, INC.

REPRODUCED BY HILTI, INC. COURTESY OF UNDERWRITERS LABORATORIES, INC.

CABLE TRAY WALL INTERSECTION DETAIL



3-4" SLEEVES THROUGH ALL WALL (FLUSH WITH WALL)

6" FROM WALL

CABLE TRAY

CABLE TRAY

BEAUFORT
 2 Fire Station Lane
 Seabrook, SC 29940

CHARLOTTE
 7315 Swanssea Lane
 Cornelius, NC 28031

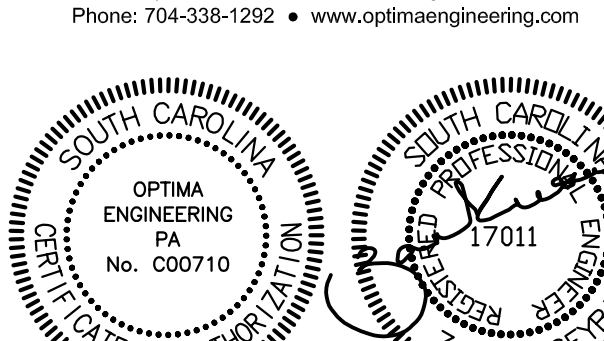
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optima
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04/29/2020

ARCHITECT / ENGINEER'S SEAL



BEAUFORT COUNTY
 ENGINEERING

BEAUFORT COUNTY DINA
 LABORATORY ADDITION

111 INDUSTRIAL VILLAGE RD
 BEAUFORT, SC 2

SECTION 01 10 00 SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS and REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: Beaufort County Engineering Beaufort County DNA Laboratory Addition
- B. Consultant Identification: The Contract Documents, dated April 29, 2020, were prepared for the Project by Beaufort Design Build, LLC and its consultants.
 - 1. Mechanical, Electrical, and Plumbing, Optima PA
- C. For the purposes of this Project, the terms Bid Documents, Construction Documents and Permit Documents may be used interchangeably.
- D. The work includes but is not limited to:
 - 1. Construction of a single-story office building addition to the existing Beaufort County DNA Laboratory. The building will be constructed adjacent to the existing Beaufort County DNA Laboratory. The existing DNA Laboratory will be occupied and fully operational for the duration of the Project.
 - 2. The Project utilizes spread footings, masonry stem wall (perimeter), masonry piers, engineered wood floor joist and pre-engineered roof trusses. .
 - 3. The building envelope includes wood framed walls with cementitious board and batten, siding and trim with aluminum windows
 - 4. Interior walls are gypsum board on wood studs with solid core wood doors in hollow metal frames. .
 - 5. Interior finishes include resilient tile, carpet and paint.
 - 6. Casework includes plastic laminate cabinets and doors with plastic laminate and solid surface counters.
 - 7. Mechanical work includes one (1) split system heat pump.
 - 8. Electrical work includes a new 120/208, 200-amp panel which is to be connected to the existing main panel. Lighting is LED.
 - 9. Plumbing systems consist of water and waste piping and fixtures for restrooms and break rooms.
 - 10. The building and building addition is not fire sprinklered.
- E. With regard to structural systems, building envelope components, window systems, doors and hardware, interior finishes, millwork and casework, mechanical systems, electrical systems and fixtures, plumbing systems and fixtures, fire sprinkler systems, alarm systems and other building systems and components, it is the contractor's responsibility to provide complete and functional systems whether or not all parts and/or pieces are indicated in the Contract Documents or not
- F. The General Contractor is responsible for all trades working under his contract and, therefore, all specifications in the Project Manual and all drawings in the Drawing Set. Failure of subcontractors to coordinate with other trades or to review specifications or drawings for other trades which could affect their work, does not relieve the General Contractor of the obligation to properly execute such work.

- G. Contractor shall furnish all material, labor, tools, supplies, equipment, transportation, superintendence, temporary construction of every nature, insurance, taxes, contributions and all services and facilities, unless specifically excepted, and install all materials, items and equipment required to complete construction of the Project, as set forth in the Contract Documents and as required to provide complete and operational systems.
- H. The Contractor shall act as the Project Expediter and be responsible for coordinating the work and schedules of others hired by him.

1.3 CONTRACT

- A. Project will be conducted under a single prime contract.

1.4 WORK UNDER OTHER CONTRACTS

- A. Separate Contract: Owner reserves the right to award a separate contract for performance of certain construction operations at Project site. Those operations may be conducted simultaneously with Work under this Contract.
- B. Contractor shall cooperate fully with separate contractors so work on other contracts may be carried out smoothly, without interfering with or delaying Work under this Contract.
- C. New open office systems furniture will be provided by the Owner under a separate contract. The contractor for this project is responsible for coordinating with the Owner and the Owner's furniture vendor and installer for installation of such furniture and for provision of electrical power as indicated on the Electrical Drawings and Divisions 26 and 27 of the Project Manual.
- D. All low-voltage wiring and devices will be provided by the Owner under a separate contract. The contractor for this project is responsible for coordinating with the Owner and the Owner's vendor and installer and for provision of a complete conduit system and grounding as indicated on the drawings and Division 27 of the Project Manual.

1.5 SPECIFICATION FORMATS AND CONVENTIONS

- A. Technical Specifications Format: The Specifications are organized into Divisions and Sections using the 48-division format and Construction Specifications Institute / Construction Specifications Canada (CSI/CSC's) 2004 "Master Format" numbering system.
 - 1. Section Identification: The Technical Specifications use section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.
- B. Technical Specifications Content: The Technical Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Abbreviated Language: Language used in the Technical Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
 - 2. Imperative mood and streamlined language are generally used in the Technical Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS

2.1 PRODUCTS ORDERED IN ADVANCE

- A. Unless otherwise stated in the Contract Documents, Costs for receiving, handling, storage if required, and installation of material and equipment shall be included in the Contract Sum.

2.2 OWNER-FURNISHED PRODUCTS

- A. Not used.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 11 00

SECTION 01 14 00 WORK RESTRICTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 USE OF PREMISES

- A. Use of Site: Limit use of premises to work in areas indicated on the drawings. Do not disturb portions of site beyond areas in which the Work is indicated.
 - 1. Construction Limits: Confine constructions operations to those areas shown on the drawings.
 - a. Construction Limits shown on the drawings represent the limits of the area which will be made available to the contractor for excavation and grading and building construction work, laydown and storage of materials and equipment, and other construction activities. Construction fencing may be placed anywhere within the Construction Limits.
 - 2. The existing Beaufort County DNA Laboratory will remain occupied and fully operational, during normal business hours, for the duration of the Project. Pedestrian and vehicle access between buildings must be maintained.
 - 3. Maintain emergency egress routes out of the south end of the existing building at all times.
 - 4. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to the Owner, the Owner's employees, and emergency vehicles at all times. Except as shown on the drawings, do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
 - c. The contractor shall document the condition of all driveways, sidewalks, curb and gutter and planting areas before starting work. Damage to existing conditions, caused by demolition and construction activities, will be repaired at the contractor's expense. Repairs shall of the same materials, craftsmanship and design as the existing conditions.
 - 5. Construction hours shall be as follows: **between 8:30 AM and 5:00 PM, Monday through Friday.**
 - a. All work delineated within the contract documents is to take place outside of normal business hours shall be provided as such.
 - 1) The contractor shall include all aspects of related work that will be required to complete work delineated to take place outside of normal business hours.
 - b. The Contractor shall advise the Architect, before submitting a bid, if there are any portions of the work indicated to take place during normal business hours that cannot be accomplished while the DNA Laboratory is occupied. Failure to do so, will result in claims for additional time or money (made after submission of a bid) for performing such work after normal work hours, being rejected.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 14 00

SECTION 01 25 00 CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract Modifications whereas all parties agree to the following:
 1. A modification in the Work or Contract Documents.
 2. The amount of the adjustment in the Contract Sum, if any.
 3. The extent of the adjustment in the Contract Time, if any.

1.3 NOTIFICATION TO SURETY

- A. The Contractor shall notify the Surety of any modifications to the Work or provisions of the Contract Documents, including, but not limited to, the Contract Price (Value) or Contract Time (Period).

1.4 MINOR CHANGES IN THE WORK

- A. The Architect shall have authority to order Minor Changes in the Work not involving adjustment to the Contract Sum or extension of the Contract Time, and consistent with the intent of the Contract Documents. Such changes shall be in a form of a written order and shall be binding for both the Owner and Contractor when fully executed.

1.5 CLAIMS FOR ADDITIONAL COST:

- A. No claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with the following:
 1. Written notice, stating the general nature of each claim, shall be delivered by the Contractor to the Architect no later than ten (10) days after the start of the event giving rise to the claim.
 2. The responsibility to substantiate a claim shall rest with the Contractor. The amount or extent of the claim, with supporting data, shall be delivered to the Architect within ten (10) days after the initial Notice of the Claim. Each claim shall be accompanied by Contractor's written statement that the adjustment claimed is the entire adjustment to which the Contractor believes he is entitled as a result of said event. The Architect shall submit a response to the Contractor within ten (10) days after receipt of the Contractor's last submittal. Prior notice is not required for Claims relating to an emergency endangering life or property.
- B. The Contractor shall submit a claim if he believes additional cost is involved for reasons including but not limited to the following:
 1. A written interpretation from the Architect.
 2. An order by the Owner to stop the Work where the Contractor was not at fault.
 3. A written order for a minor change in the Work issued by the Architect.
 4. A change in the Scope of the Work by the Architect.

1.6 PROPOSAL REQUESTS

- A. Work Change Proposal Requests (WCPR) generated by the Architect to modify the Work or Contract Documents. The Architect will issue a detailed description of proposed modifications in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications. The description is for information and shall not be considered as a directive to automatically stop work or execute the proposed change.
1. Within ten (10) days after receipt of the WCPR, the Contractor shall submit a Proposal Request with a firm cost to adjust the Contract Sum and, if necessary, the Contract Time, for execution of the change. As applicable, Proposal Requests shall include supporting documents from Subcontractors.
 - a. Include a list of quantities of (plus or minus) the materials and/or products required with unit prices, total amount of purchases, and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change, including social security, old age and unemployment insurance, fringe benefits, and workmen's compensation insurance.
 - d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start, and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 2. The Contractor may initiate proposals if latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request to the Architect.
 - a. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - b. Include a list of quantities of (plus or minus) the materials and/or products required with unit prices, total amount of purchases, and credits to be made. If requested, furnish survey data to substantiate quantities.
 - c. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - d. Include costs of labor and supervision directly attributable to the change, including social security, old age and unemployment insurance, fringe benefits, and workmen's compensation insurance.
 - e. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - f. Comply with requirements in Division 1 Section, of the Technical Specifications "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.
- B. Profit and Overhead shall not exceed ten percent (10%) of the cost of the changes to the Work.
- C. Claims for additional time, must show that the Critical Path, as identified in the Contractor's Schedule, has been altered by the subject delay and that delayed work cannot be completed on an alternate or parallel path without impact to the Critical Path.
- D. Use the Proposal Request Form provided in the Project Manual.
- E. Proposal Requests shall be submitted electronically in PDF file format.

- F. The Contractor shall be responsible for keeping and updating a "Proposal Request Log", listing all Proposal Requests. The log shall indicate the date of each Proposal Request, approval date, action taken, running balances, and a complete description of each change.
- G. After all parties have signed "The Proposal Request Form", it shall be the Contractor's authorization to proceed with the changes to the Work.
- H. If the Owner and Contractor do not agree with the requested adjustment in the Contract Sum, the Contract Time or the method of determining each, the provisions for Mediation shall be utilized.

1.8 CHANGE ORDER PROCEDURES

- A. The Architect will issue a Change Order for signatures once all of the Proposal Request(s) amounts exceed the Contingency Allowance amount.
- B. Until the Contingency Allowance amount has been exceeded, the Architect will issue a written directive for adjustment of the Contingency Allowance.
- C. The Contractor shall not invoice for a Change Order until it has been executed by all parties.

1.9 CONSTRUCTION CHANGE DIRECTIVE

- A. The Consultant may issue a Construction Change Directive (CCD), signed by the Owner, to the Contractor directing a change in the Work. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. CCDs will contain a complete description of changes to the scope of work and designate the method to be followed for determining a change in the Contract Sum or the Contract Time.
- B. Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved. And the Contractor shall advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the CCD for determining the proposed adjustment in the Contract Sum or Contract Time.
- C. The Contractor shall maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.10 CLAIMS FOR ADDITIONAL COST AND/OR TIME DUE TO WEATHER DELAY

- A. Claims for additional cost and/or time must be supported by historical data, provided by the National Oceanic and Atmospheric Administration (NOAA), showing that weather events occurring during the Contract Period, were excessive and not typical for the location of the Project and the time of the year. Weather data can be obtained from www.noaa.gov.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PROCESSING CHANGE ORDERS

- A. The Change Order will be issued describing the change or changes to the Work and/or Contract Documents and will refer to the Proposal Requests.
- B. The Consultant shall issue one copy of the Change Order to the Contractor. The Contractor shall promptly sign the copy and return the copy to the Consultant who will sign the Change Order and forward the Change Order to the Owner to execute.
- C. Once the Change Order has been full executed, a copy shall be forwarded to the Consultant and to the Contractor for their files.

END OF SECTION 01 25 00

SECTION 01 29 00 PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
 - 1. Division 1, of the Technical Specifications Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
- C. In lieu preparing and submitting a Schedule of Values, the contractor may submit a notarized letter to the Owner stating that a single Application for Payment will be submitted for all work, after the County has issued a Certificate of Occupancy (or Compliance) and the Owner and Architect have accepted all work as complete in accordance with the Contract Documents.
- D. No more than two Applications for Payment will be accepted; the first at fifteen (15) calendar days from Notice to Proceed and the second after the County has issued a Certificate of Occupancy (or Compliance) and the Owner and Architect have accepted all work as complete and in accordance with the Contract Documents.
 - 1. If the Contract is modified to extend the Contract Period, the two payments will remain at fifty percent (50%) and one hundred percent (100%) of the Contract Period.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms AIA G702.
 - b. Continuation Sheets.
 - 2. Submit the Schedule of Values to the Consultant at the earliest possible date but no later than fourteen days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: As appropriate use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each of the Technical Specifications Section and line item for potential billing against the Contingency Allowance.
 - 1. Identification: Include the following Project information on the Schedule of Values:
 - a. Project name and location.

- b. Name of Architect.
 - c. Contract number.
 - d. Contractor's name and address.
 - e. Date of submittal.
2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Description of the Work.
 - b. Name of subcontractors.
 - c. Name of manufacturer or fabricator.
 - d. Name of suppliers.
 - e. Change Orders (numbers) that affect value.
 - f. Dollar value.
 3. Group items that are "Non-Tangible & Non-Taxable and Tangible & Taxable Items" on the Schedule of Values.
 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide several line items for principal subcontract amounts, where appropriate.
 5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include labor and materials and/or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.
 7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 8. Closeout documentation: Provide a separate line item in the Schedule of Values for close out documentation.
 9. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
 10. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Consultant and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involves additional requirements.
- B. Such applications shall not include requests for payment of amounts the Contractor does not include requests for payment of amounts the Contractor does not intend to pay to a Subcontractor or material supplier because of a dispute or other reason.

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

The Contractor warrants that title to all Work covered by an Application and Certificate for payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application and Certificate for payment all work for which Certificates for payment have been previously issued and payment received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of claims of liens, claims, security, interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

- D. Payment Application Times: No more than two Applications for Payment will be accepted; the first at fifteen (15) calendar days from Notice to Proceed and the second after the County has issued a Certificate of Occupancy (or Compliance) and the Owner and Architect have accepted all work as complete and in accordance with the Contract Documents.

- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. The Consultant will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
3. The County shall retain five (5%) percent of each payment to up fifty (50%) percent completion of the Contract.
 - a. The Owner shall not retain more than five percent (5%) of any periodic payment due a prime Contractor.
 - b. When the project is fifty percent (50%) complete, the Owner, with written consent of the surety, **shall not retain any further** retainage from periodic payments due the Contractor if the Contractor continues to perform satisfactorily and any nonconforming work identified in writing prior to that time by the Consultant or Owner has been corrected by the Contractor and accepted by the Consultant and Owner. If the Consultant determines the Contractor's performance is unsatisfactory, the Owner may reinstate retainage for each subsequent periodic payment application as authorized in this subsection up to the maximum amount of five percent (5%). The project shall be deemed fifty percent (50%) complete when the Contractor's gross project invoices, excluding the value of materials stored off-site, equal or exceed fifty percent (50%) of the value of the contract, except the value of materials stored on-site shall not exceed twenty percent (20%) of the Contractor's gross project invoices for the purpose of determining whether the project is fifty percent (50%) complete.
 - c. Within 60 days after the submission of a pay request and one of the following occurs, as specified in the contract documents, the Owner with written consent of the surety shall release to the Contractor all retainage on payments held by the Owner:
 - 1) The Owner receives a certificate of substantial completion from the Consultant in charge of the project; or (ii) the Owner receives beneficial occupancy or use of the project. However, the Owner may retain sufficient funds to secure completion of the project or corrections on any work. If the Owner retains funds,

the amount retained shall not exceed two and one-half times the estimated value of the work to be completed or corrected. Any reduction in the amount of the retainage on payments shall be with the consent of the Contractor's surety.

- d. The existence of any third-party claims against the Contractor or any additive change orders to the construction contract shall not be a basis for delaying the release of any retainage on payments.
 - 1) Full payment, less authorized deductions, shall also be made for those trades that have reached one hundred percent (100%) completion of their contract by or before the project is fifty percent (50%) complete if the Contractor has performed satisfactorily. However, payment to the early finishing trades is contingent upon the Owner's receipt of an approval or certification from the Consultant of record or applicable engineer that the work performed by the subcontractor is acceptable and in accordance with the contract documents. At that time, the Owner shall reduce the retainage for such trades to **five-tenths percent (0.5%)** of the contract. Payments under this subsection shall be made no later than 60 days following receipt of the subcontractor's request or immediately upon receipt of the surety's consent, whichever occurs later. Early finishing trades under this subsection shall include structural steel, piling, caisson, and demolition. The early finishing trades for which line-item release of retained funds is required shall not be construed to prevent an Owner or an Owner's representative from identifying any other trades not listed in this subsection that are also allowed line-item release of retained funds. Should the Owner or Owner's representative identify any other trades to be afforded line-item release of retainage, the trade shall be listed in the original bid documents. Each bid document shall list the inspections required by the Owner before accepting the work, and any financial information required by the Owner to release payment to the trades, except the failure of the bid documents to contain this information shall not obligate the Owner to release the retainage if it has not received the required certification from the Consultant of record or applicable engineer.
 - 2) Notwithstanding 3-a & b of this section, following fifty percent (50%) completion of the project, the Owner shall be authorized to withhold additional retainage from a subsequent periodic payment, not to exceed five percent (5%) as set forth in 3-a of this section, in order to allow the Owner to retain two and one-half percent (2.5%) total retainage through the completion of the project. In the event that the Owner elects to withhold additional retainage on any periodic payment subsequent to release of retainage pursuant to 3-d-i of this section, the General Contractor may also withhold from the subcontractors remaining on the project sufficient retainage to offset the additional retainage held by the Owner, notwithstanding the actual percentage of retainage withheld by the Owner of the project as a whole.
 - 3) Neither the Owner's nor Contractor's release of retainage on payments as part of a payment in full on a line-item of work under 3-d-i of this section shall affect any applicable warranties on work done by the Contractor or subcontractor, and the warranties shall not begin to run any earlier than either the Owner's receipt of a certificate of substantial completion from the Consultant in charge of the project or the Owner receives beneficial occupancy.
- e. Nothing in this section shall prevent the prime Contractor at the time of application and certification to the Owner from withholding application and certification to the Owner for payment to the subcontractor for unsatisfactory job progress; defective construction not remedied; disputed work; third party claims filed or reasonable evidence that claim will be filed; failure of subcontractor to make timely payments for labor, equipment, and materials; damage to prime Contractor or another subcontractor; reasonable evidence that subcontract cannot be completed for the unpaid balance of the subcontract sum;

- or a reasonable amount for retainage not to exceed the initial percentage retained by the Owner.
- f. Nothing in this section shall prevent the Owner from withholding payment to the Contractor in addition to the amounts authorized by this section for unsatisfactory job progress, defective construction not remedied, disputed work, or third-party claims filed against the Owner or reasonable evidence that a third-party claim will be filed.
4. Provide a separate line item in the Schedule of values for close out documentation as set forth in the Supplementary Conditions.
- F. Submit Applications for Payment in electronic PDF format.
- G. With each Application and Certification for payment, the Contractor must furnish for themselves, as well as for all Subcontractors, certified statements stating the cost of the property purchased from each vendor and the amount of sales and/or use taxes paid. See General Conditions, Sales and Use Tax for additional information.
- H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
- I. Neither Final payment nor any remaining retained percentage shall become due until the Contractor submits the following to the Consultant for approval:
1. An affidavit that payrolls, bills for material and other indebtedness connected with the Work has been paid or otherwise satisfied,
 2. A certificate evidencing that insurance required by the Contract Document to remain in force after Final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner,
 3. Consent of surety to Final payment and
 4. If required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of claim of liens, claims security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If the Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such claim of lien. If such claim of lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such claim, including all costs and reasonable attorneys' fees.
 5. A list of all suppliers and subcontractors that were involved with the project. As part of the list, the Contractor shall include the address, phone number, what they supplied or Work performed, and a contact name.
 6. "As-Builts" Drawings and all other specified closeout documents.
 7. Maintenance and Operation instructions and guarantees.
- J. Final Payment Application: Submit three originals with the final Application for Payment with releases and supporting documentation not previously submitted and accepted, including (as applicable), but not limited, to the following:
1. Warranties and Test results required by the Contract Documents.
 2. Updated final statement, accounting for final changes to the Contract Sum.
 3. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 4. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 5. AIA Document G707, "Consent of Surety to Final Payment."

6. Additional Evidence that claims has been settled if required by the Owner. An example of the evidence could be a letter from a subcontractor indicating that he has been paid in full for the work that he has performed.
7. Certificates from all local and State Governing Agencies as required by Law.
8. Final liquidated damages settlement statement.
9. List of Subcontractors and Suppliers that has contributed to the completion of the Work. The list shall include:
 - a. Material they supplied or type of construction they performed.
 - b. Address
 - c. Contact person
 - d. Phone number
10. Small and Minority Business Participation final accounting documentation.
11. Final Sales Tax Form.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 31 00 PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. To enable orderly review during progress of the Work, and to provide for systematic discussion of problems, the Architect conduct project meetings and compile an agenda for each meeting throughout the construction period.
- B. This Section includes administrative provisions for coordinating construction operations on the Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Coordination Drawings.
 - 3. Administrative and supervisory personnel.
 - 4. Project meetings.
- C. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1, of the Technical Specifications Section "Closeout Procedures" for coordinating Contract closeout.

1.3 COORDINATION

- A. Coordination: Coordinate construction operations included in various Sections of the Technical Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components.
 - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. If necessary, the Architect shall prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's Construction Schedule.
 - 2. Preparation of the Schedule of Values.
 - 3. Installation and removal of temporary facilities and controls.

4. Delivery and processing of submittals.
5. Progress meetings.
6. Project closeout activities.

1.4 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.
- B. The General Contractor's Project Superintendent shall be on site at any and all times that work is being performed on the Project – i.e., after hours work and weekend work.
- C. The General Contractor's Project Superintendent must be assigned to the Project full-time.

1.5 REQUESTS FOR INFORMATION

- A. Requests for information (RFI) and/or interpretation during construction shall be made in written format.
- B. RFI forms shall include the date of the request, the date by which an answer is required (to avoid a schedule delay) and a place for the Architect or consultant to provide and answer.
- C. A sample RFI form is provided in the Project Manual.
- D. RFI may also be made verbally during a Project Meeting in which case answers will be documented in the meeting notes.

1.6 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting.
 2. Agenda: The Architect will prepare the meeting agenda and distribute the agenda to all invited attendees.
 3. Minutes:
 - a. The Architect will compile minutes of each project meeting and will distribute copies to the Contractor and required copies to the Owner.
 - b. Recipients of copies may make and distribute such other copies as they wish.
 4. Attendance:
 - a. To the maximum extent practical, assign the same person or persons to represent the Contractor at the project meetings throughout progress of the Work.
 - b. Subcontractors, materials suppliers, and others may be invited to attend those project meetings in which their aspect of the Work is involved.
- B. Pre-construction Conference: The Architect will schedule a pre-construction conference before starting construction, at a time convenient to Owner, Architect and contractor, but no later than 14 days after execution of the Construction Contract.
 1. Attendees: Authorized representatives of Owner, Architect, Consulting Engineer, Contractor and its superintendent; major subcontractors and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.

- b. Phasing.
 - c. Critical work sequencing.
 - d. Designation of responsible personnel.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for processing Applications for Payment.
 - g. Distribution of the Contract Documents.
 - h. Submittal procedures.
 - i. Preparation of Record Documents.
 - j. Use of the premises.
 - k. Responsibility for temporary facilities and controls.
 - l. Parking availability.
 - m. Office, work, and storage areas.
 - n. Equipment deliveries and priorities.
 - o. Security.
 - p. Working hours.
- D. Progress Meetings: A Progress Meeting shall be held bi-weekly, the Architect will provide an agenda.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Contractor's Construction Schedule.
- B. Contractor is responsible for documenting existing damage at existing building and site prior to construction. Damage not documented will be the responsibility of the Contractor at the Contractor's expense.

1.3 SUBMITTALS

- A. Contractor's Proposed Construction Schedule: Submit in electronic PDF format utilizing an 11"x17" print layout.
- B. Schedule must be approved by the Owner and the Architect prior to starting work.

PART 2 - PRODUCTS

2.1 CONTRACTORS CONSTRUCTION SCHEDULE

- A. Critical Path Schedule: Submit proposed critical path construction schedule within seven (7) days of date established for the Notice to Proceed
- B. Time Frame: Extend schedule from date established for the Notice to Proceed, through the date of Final Completion.
- C. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities from Notice to Proceed through Final Completion.
- D. Critical Path: Clearly indicate how critical path tasks are linked to each other.
 - 1. Claims for additional time (and the associated cost) will only be approved if delays can be shown to have affected the Critical Path. Failure to illustrate a logical Critical Path will make claims for additional time difficult to justify.
- E. Contract completion date shall not be changed unless specifically authorized by change order. Regardless of the completion date shown on the Contractor's Proposed Construction Schedule, delays and associated costs will be based on the project duration as specified in the Project Manual.

PART 3 - EXECUTION

2.2 CRITICAL PATH CONSTRUCTION SCHEDULE

- A. Contractor's Proposed Construction Schedule Updating: At regular intervals, update

schedule to reflect actual construction progress and activities.

1. Schedule will be reviewed at each regular progress meeting.

END OF SECTION 01 32 00

SECTION 01 33 00 SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.
- B. Due to the relatively short Contract Period associated with the Project, submittal review time periods are three (7) calendar days from receipt. This applies to first review, re-review and re-submission.

1.3 SUBMITTAL PROCEDURES

- A. The Contractor shall provide submittals as indicated in the technical specifications included in the Project Manual.
- B. General: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by the Architect or Consulting Engineers for Contractor's use in preparing submittals.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Consultant reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow enough time for submittal review, including time for re-submittals, as follows. Time for review shall commence on Consultant's receipt of submittal. Allow fourteen (14) calendar days for review of each submittal and fourteen (14) calendar days for review of each re-submittal.
- E. Identification: Place a permanent label or title block on each submittal for identification. Indicate name of firm or entity that prepared each submittal.
- F. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.
- G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Consultant will return submittals, without review, received from sources other than Contractor.
- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities.
- I. Use for Construction: Use only final submittals with mark indicating action taken by Consultant in connection with construction.

PART 2 - PRODUCTS

2.1 SUBMITTALS

- A. General: Prepare and submit Submittals as required by individual Specification Sections.
 - 1. Number of Copies: Submit in electronic PDF format.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. Mark each copy of each submittal to show which products and options are applicable.
 - 2. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.
 - g. Printed performance curves.
 - h. Operational range diagrams.
 - i. Mill reports.
 - j. Standard product operating and maintenance manuals.
 - k. Compliance with recognized trade association standards.
 - l. Compliance with recognized testing agency standards.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.
 - o. Manufacturer's location.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 - 1. Preparation: Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams and existing conditions.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Templates and patterns.
 - g. Schedules.
 - h. Design calculations.
 - i. Compliance with specified standards.
 - j. Notation of coordination requirements.
 - k. Notation of dimensions established by field measurement.

- D. Samples: Prepare physical units of materials or products, including the following:
1. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 2. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Consultant's sample where so indicated. Attach label on unexposed side that includes the following:
 - a. Generic description of Sample.
 - b. Product name or name of manufacturer.
 - c. Sample source.
 3. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
 - a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least three sets of paired units that show approximate limits of the variations. The consultant will return submittal with the option selected.
 - b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Consultant.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 CONSULTANT'S ACTION

- A. General: Consultant will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Consultant will review each submittal, make marks or otherwise indicate corrections or modifications required, and return it. Consultant will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
- C. At the Consultant's discretion, Submittals not required by the Contract Documents might not be reviewed and may be discarded.
- D. When a submittal is returned "approved as noted" (or similar), the Contractor must provide written response to all comments within three (3) calendar days. Failure to do so will result in the submittal status being changed to "Rejected."
- E. **When a submittal is returned "Approved as Noted" or "Revise and Resubmit" the contractor shall provide a written response or resubmittal within ten (10) working days of the submittal review date. Failure to do so will result in the submittal being rejected (in its entirety). Email is an acceptable form of written response.**

END OF SECTION 01 33 00

SECTION 01 50 00 TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.
- B. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- C. Utilities: The contractor will have access to and use of existing water, sewer and power at the existing Beaufort County DNA Laboratory. It is the contractor's responsibility to utilize these utilities in a manner which will not compromise normal operation of the building and its occupants. Failure to do so will result in the contractor being required to provide temporary utilities at no additional cost to the owner.
- D. Support facilities include, but are not limited to, the following:
 - 1. Waste disposal.
 - 2. Lifts and hoists.
 - 3. Temporary restrooms / toilets.
 - 4. Drinking water.
 - 5. Construction aids and miscellaneous services and facilities.
- E. Security and protection facilities include, but are not limited to, the following:
 - 1. Environmental protection.
 - 2. Storm water control.
 - 3. Site enclosure fence.
 - 4. Security enclosure and lockup.
 - 5. Barricades, warning signs, and lights.
 - 6. Temporary enclosures.
 - 7. Temporary partitions.
 - 8. Fire protection.

1.3 DEFINITIONS

- A. OSHA: Occupational Safety and Health Administration.

PART 2 - PRODUCTS:

2.1 MATERIALS

- A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if indicated on the plans and/or specifications. Provide materials suitable for use intended.
- B. Chain-Link Fencing: Minimum 2-inch , 0.148-inch- thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top rails.
- C. Portable Chain-Link Fencing: Minimum 2-inch 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide concrete or galvanized steel bases for supporting posts.
- D. Lumber and Plywood: Comply with requirements in Division 6 Section."
- E. Gypsum Board: Minimum 1/2 inch thick by 48 inches wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36.
- F. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indices of 25 and 50, respectively.
- G. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.
- H. Water: Potable.

2.2 EQUIPMENT

- A. General: Provide equipment suitable for use intended.
- B. Field Offices: A field office is not required however, the contractor's on-site superintendent shall have immediate access to email and shall maintain a set of record drawings on site where they are immediately accessible to the Architect. Progress meetings will be held on site.
- C. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.
 - 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure and the requirements of the local Governing agency.
- D. Self-Contained Toilet Units: Single-occupant units of chemical or aerated recirculation or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- E. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.
- F. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.
- G. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.

PART 3 - EXECUTION

3.1 GENERAL

- A. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
- C. Maintain facilities in a clean and orderly manner. Repair damaged facilities promptly and with materials consistent with original construction and makeup.
- D. It is the contractor's responsibility to secure all temporary facilities after hours to prevent use by unauthorized personnel and to reduce the risk of damage, theft and vandalism.

3.2 UTILITIES

- A. The contractor shall access and the existing building and provide utilities to the Project Area in a manner which does not compromise normal operations in the portion of the building which will remain occupied and in a manner which maintains that portion of the building in a safe, secure and watertight condition.
- B. It is the contractor's responsibility to provide temporary electrical outlets, devices, lighting and associated wiring and conduit in accordance with the National Electrical Code, the International Building Code and OSHA Standards for the Construction Industry.
- C. Temporary lighting shall be provided in accordance with good standards and practices for safety and security and in accordance with OSHA Standards for the Construction Industry.

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- B. Storm water Control: Protect existing storm water structures, ditches and swales as indicated in the Civil and Architectural Drawings. If not indicated, provide silt fence located, installed and secured at existing storm water structures (yard inlets, curb inlets, etc.) to prevent silt, debris and other contaminants resulting from demolition and construction activities from entering the existing storm water system. Inspect and repair protection after each rain event.
- C. Site Enclosure Fence: Fencing shall be provided by the Contractor as required to provide a secure and safe Job site.
- D. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.
- E. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather tight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
- F. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.
- G. Temporary Fire Protection:
 - 1. Maintain all existing fire protection and fire alarm systems in good working order at all times.

3.4 OPERATION, TERMINATION, AND REMOVAL

- A. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.

- B. Termination and Removal: Remove each temporary facility when need for its service has ended. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are the property of Contractor.
 2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 1, of the Technical Specifications Section "Closeout Procedures."

END OF SECTION 01 50 00

SECTION 01 60 00 PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following administrative and procedural requirements: selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.

1.3 DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 - 5. Store products to allow for inspection and measurement of quantity or counting of units.
 - 6. Store materials in a manner that will not endanger Project structure.
 - 7. Store products that are subject to damage by the elements, under cover in a weather tight enclosure above ground, with ventilation adequate to prevent condensation.
 - 8. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - 9. Protect stored products from damage.

- B. Storage: As necessary, provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Allowable storage area is shown on the drawings.

PART 2 - PRODUCTS: (NOT USED)

PART 3 - EXECUTION: (NOT USED)

END OF SECTION 01 60 00

SECTION 01 70 00 EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Progress cleaning.
 - 3. Starting and adjusting.
 - 4. Protection of installed construction.
 - 5. Correction of the Work.

PART 2 - PRODUCTS: (NOT USED)

PART 3 - EXECUTION:

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
- C. Identify and mark existing ductwork, electrical circuits, boiler and chiller piping, domestic water piping, sanitary sewer piping and other distribution systems before disconnecting. Ensure that the portion of the existing building which will remain occupied will not be without service when such distribution systems are disconnected and re-routed.

3.2 PREPARATION

- A. Existing Utility Interruptions: Notify Owner and Architect not less than two days in advance of proposed utility interruptions.
 - 1. Do not proceed with utility interruptions without Owner and Architect's written permission.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Consultant. Include a detailed description of problem encountered, together with recommendations for modifications of the Contract Documents.

3.3 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations. Dispose of material accordance to Division 1, Section "Construction Waste Management".
- B. Site: Maintain Project site free of waste materials and debris. Remove dumpsters and similar trash containers when filled. Do not allow units to be overfilled.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
 - 1. Thoroughly clean surfaces and similar features before applying paint or other finishing materials.
- H. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration until Substantial Completion.
- J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- K. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.4 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.6 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section 01 73 10 "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their original (prior to starting work) condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

END OF SECTION 01 70 00

SECTION 01 73 10 CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.

1.3 DEFINITIONS

- A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 QUALITY ASSURANCE

- A. Structural Elements: Do not cut or otherwise alter any structural elements without written approval by the Owner and Architect.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
- C. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or those results in increased maintenance or decreased operational life or safety.
 - 1. Water, moisture, or vapor barriers.
 - 2. Membranes and flashings.
 - 3. Equipment supports.
 - 4. Piping, ductwork, vessels, and equipment.
 - 5. Electrical circuits, wiring and conduit.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1.5 WARRANTY

- A. Verify warranty requirements of all materials, systems, equipment, assemblies, etc. prior to cutting and patching. If cutting and patching results in a warranty being voided or reduced in coverage and/or term, the contractor will be required to replace that material, system, equipment, assembly, etc. in its entirety.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections of the Technical Specifications.
- B. Materials: Use materials identical to those being cut and patched.

PART 3 - EXECUTION:

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 5. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of the Technical Specifications.
 - 1. Inspection: Test and inspect patched areas after completion to demonstrate integrity of installation.

2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather tight condition.

END OF SECTION 01 73 10

SECTION 01 77 00 CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all Divisions of the Technical Specifications, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Project as-built documents.
 - 3. Warranties.
 - 4. Final cleaning.

1.3 SUBSTANTIAL COMPLETION (NOT USED)

1.4 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
 - 1. Submit a final Application for Payment according to Division 1, of the Technical Specifications Section "Payment Procedures."
 - 2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (Punch-List), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, the Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. The Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
 - 1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - 2. The Contactor shall take immediate steps to correct the stated deficiencies, and send a written notice to the Architect, certifying the Project is complete, at which time the Architect will re-inspect the Work. This review and additional reviews by the Architect where the Work is not considered Final Completion will be considered an additional service from the Architect. The Contractor will be charged for these additional services incurred by such failure including travel time, observation time, and administrative time at the Architect's hourly rate, as well as all expenses associated with the distribution of a written notice stating the reasons for failure to reach final completion.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: The Architect will prepare and distribute a List of Incomplete Items via email in electronic PDF format.
- B. To the extent possible, deficiencies will be organized by project area or space – west facade, service drive, corridor, etc.
- C. Construction Punch-List form follows this section.

1.6 GUARANTEES AND WARRANTIES

- A. The contractor shall provide a General Guarantee against defect due to faulty products or faulty workmanship or negligence for a period of twelve (12) months and an Incidental Building Water-tightness Guarantee a period of twelve (12) months.
- B. Guarantees apply to new work only and do not apply to existing conditions which are not altered by the Project.
- C. The General and Incidental Building water-Tightness Guarantee form provided in the Project Manual is to be completed, signed and notarized and submitted with the contractor's final Application for Payment.
- D. There are no other guarantees or Warranties required.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION:

3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
- C. Cleaning is only required in the Project Area and areas outside of the Project Area which were impacted by demolition and construction activities due to access, storage, staging and similar activities.
 - 1. Complete the following cleaning operations in project work areas before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by demolition and construction activities, including landscape areas and lawns of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces.
 - f. Sweep concrete floors broom clean in unoccupied spaces.
 - g. Remove labels that are not permanent.

- h. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - i. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - j. Replace parts subject to unusual operating conditions.
 - k. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - l. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - m. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
- D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01 77 00

SECTION 02 21 00

REPORT OF GEOTECHNICAL EXPLORATION

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. The following pages consist of the Geotechnical Engineering Report, as prepared by Whitaker Laboratory, Inc. (dated March 24, 2020).
- B. By inclusion in the Project Manual, the Geotechnical Engineering Report is made part of Bid and Contract Documents.
- C. The Contractor is responsible for reviewing the Report in its entirety.

END OF SECTION 02 21 00



Geotechnical Engineering Report

**Proposed Addition Structure
Beaufort County DNA Laboratory
111 Industrial Village Road
Beaufort, South Carolina
April 24, 2020
Project No. 4-24-20-5**

Prepared For:

Beaufort Design Build, LLC
Seabrook, SC

Prepared By:

Whitaker Laboratory, Inc.
Savannah, Georgia



WHITAKER LABORATORY, INC.

P.O. Box 7078 2500 Tremont Road Savannah, Georgia 31418
(912) 234-0696 Fax (912) 233-5061 Email: info@whitakerlab.net

April 24, 2020

Beaufort Design Build, LLC
2 Fire Station Lane
Seabrook, SC 29940

Attention: Adam Biery
(843) 466-3664
adam@beaufortdesignbuild.com

Referencing: Report of Geotechnical Evaluation Services for
Proposed Addition Structure
Beaufort County DNA Laboratory Addition
111 Industrial Village Road, Beaufort, South Carolina
Project No. 4-24-20-5

Dear Mr. Biery,

As requested, WHITAKER LABORATORY, INC. has conducted a geotechnical investigation at the above referenced site. Authorization to perform this investigation was provided by your acceptance of our proposal dated April 15, 2020. Our findings and recommendations for design and construction are attached and it is important that you read the report in its entirety.

It is a pleasure to provide our services to you and we look forward to further opportunities to assist you on this and other projects.

Respectfully submitted,
WHITAKER LABORATORY, INC.

Jason H. Follo, P.E.
SC Registered Engineer
#20225



Blake L. Jones, P.E.
SC Registered Engineer
#37684



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REPORT OF GEOTECHNICAL EVALUATION
Proposed Addition Structure
Beaufort County DNA Laboratory
111 Industrial Village Road, Beaufort, South Carolina

I. INTRODUCTION / SCOPE

WHITAKER LABORATORY, INC. has completed this field investigation of the surface and subsurface conditions at this site. The preliminary conditions found, and how those conditions could affect the design and construction of foundations for the structures planned, form the basis for this report. Regardless of the thoroughness of any geotechnical investigation, there are limitations, and deviations from the conditions found in this investigation could be subsequently disclosed. We recommend that this report be provided to all parties involved in the planned development to include but not necessarily limited to the Owner, Architect, Design Engineers, General Contractor and sub-contractors. Unanticipated circumstances often arise during sitework, earthwork and foundation construction. Accordingly, we recommend that our firm be retained to provide the construction surveillance, inspection, and testing on the project, thereby being readily available to assist in the evaluation of any conditions encountered that differ from those anticipated.

The site is located at 111 Industrial Village Road in Beaufort, SC. We understand a new addition structure and associated pavements are planned for construction on this site. In an effort to evaluate subsurface soil conditions and their impact on the design and construction of the planned addition structure, a total of three standard penetration test (SPT) borings were performed. The borings were advanced within the planned construction area extending to depths ranging from 4 to 35 feet below the ground surface.

Please note that this evaluation only applies to the foundations and pavements planned for construction. This evaluation does not apply to any future improvements, which may be made to the site. In particular, if at any time should additional fill be placed, adjacent to or nearby the structures referenced in this report, additional geotechnical borings and a follow up geotechnical analysis will be required. Standard billing rates will apply for this work.

II. EXECUTIVE SUMMARY

The following recommendations shall be considered a summary of the recommendations contained within this report and utilized as such. This report shall be read in its entirety.

- The encountered surface soils can be made suitable for shallow spread pier and/or strip footing foundations with slab-on-grade flooring if liquefaction induced settlement is not of concern to the owner and/or structural design, our foundation loading assumptions are not exceeded and the recommendations contained within this report are performed and verified during construction.

At any time, we will be glad to discuss the contents of this report. This includes insuring that you fully consider potential problems for design and construction procedures in respect to interpretations of the data.

III. PROJECT INFORMATION & DESCRIPTION

We have not been provided foundation loads for the building, however for the purpose of this report we will assume that foundation loads will not exceed 30 kips for columns and/or 2 kips per linear foot for walls. We will further assume that site grades will not be raised more than 2 feet above existing ground surface elevations to achieve finished grade elevations for the ground surface and/or slabs-on-grade.

Item	Description
Proposed Improvements	New Building Addition Structure
Finished Grade elevation for ground surface and/or slabs-on-grade	Assume maximum 2 feet above existing grade
Maximum Foundation loads	Assume 30 kips for columns and 2 kips for walls
Maximum Floor Loads for slabs-on-grade	Assume 100 pounds per square foot
Maximum allowable settlement	Assume 1 inch overall and ½ inch differential
Above information was assumed by Whitaker Laboratory, Inc.	

If our assumptions are incorrect, we should be contacted immediately, provided the correct information and allowed an opportunity to change and/or modify the recommendations contained within this report if necessary.

IV. SITE LOCATION & DESCRIPTION

Item	Description
Location	111 Industrial Village Road, Beaufort, SC
Existing Structures	None within planned construction area
Current ground cover	Grassed area
Existing topography	Generally flat with elevated mound in center

At the time of our site visit, the planned building pad area consisted of an open grassed area with elevated mound in center (approximately 18"). Elevated mound may be from existing drain field. The site and boring locations on the site were accessible to our rubber tire truck mounted drilling equipment at the time of our mobilization.

V. AREA GEOLOGY

This project is located in Beaufort, South Carolina. This overall project area resides along the eastern edge of the South Atlantic Coastal Plain. In South Carolina and Georgia, this broad, gently sloping region extends southeastward from the Fall Line (Chesterfield - Columbia - Augusta - Macon - Columbus) to the Atlantic Ocean. The soils encountered are sedimentary in origin, and consist of layered marine deposits of sands, silts, and clays. These deposits have since been subjected to successive erosion and re-deposition, by fluctuations of sea levels, storm tides, and winds. Many of the surface sands are the result of depositional forces along ancient beaches, which formed during the changing shoreline and river conditions. Intermittent deposits of shells occur within the strata at irregular intervals. The surface soils in a majority of this Coastal Plain area were deposited during the Pleistocene Era, however surface soils near the coast are likely of the Holocene Era.

VI. TEST BORINGS AND SUBSURFACE CONDITIONS

The field exploration to determine the characteristics of the subsurface materials included a reconnaissance of the project site, and the drilling of exploratory borings. Standard penetration test borings were performed using rotary head drilling equipment and advancing hollow stem augers. Sampling and Standard Penetration Testing, (SPT), was performed in accordance with ASTM D-1586. SPT samples were taken at 2.5 foot intervals of depth for the first 10 feet, and at 5.0 foot intervals thereafter. Standard Penetration testing is done with a 140 pound hammer falling 30-inches and a two inch diameter sampling spoon. Results of Standard Penetration Testing (SPT N values) provide an indication of the relative consistency, density and in-situ strengths of the tested soils.

Soil samples from SPT testing and from the auger cuttings have been used for identification and visual classification. The subsurface stratification and the profile as presented in the boring logs, represent approximate boundary lines between the strata and materials encountered. These boundary lines are usually gradual and not clearly defined, and it is sometimes difficult to record changes in stratification precisely. It should be noted that underlying soil conditions can, and do, vary considerably within short lateral distances. It is possible that conditions may be revealed between boring locations that are different from those found by our borings and used for our analysis.

The approximate locations of the borings are shown on the attached BORING LOCATION PLAN. Our drilling crews, based on landmarks and features available at the time of drilling, have estimated the locations of the borings in the field. If the precise location of the boreholes is critical, this can be determined by employing a land surveying firm to plot the true locations. Such survey should be completed promptly and before any disturbance to the area has occurred. If desired, Whitaker Laboratory, Inc. will be glad to coordinate surveying arrangements for an additional fee.

Below approximately 6 to 8 inches of topsoil, the subsurface soils on this site predominately consist of loose to dense sands and silty sands (SP-SM and SM) extending to the termination depth of the deeper boring at 35 feet below the ground surface.

The above description of the subsurface profile should be considered a general description intended to highlight the major strata encountered. More detailed profiles can be observed within the attached logs. Please note that boring logs are only representative of their location. Stratification transitions should be expected to occur outside and between boring locations. Taking into account that sampling was not performed on a continuous basis within SPT borings, lines drawn representing elevations of stratification changes shown on the SPT boring log were estimated.

VII. GROUNDWATER TABLE

The apparent groundwater table was measured for each boring location at the time of boring. Groundwater levels were measured to range from 2 to 3 feet below the ground surface at the time of boring. The groundwater elevation can be expected to fluctuate with the season of the year, surrounding ground surface conditions, and with recent rainfall amounts. Thus, groundwater elevations shown on the boring logs should be considered an estimate and valid only for the time and date of observation.

If groundwater remains at the observed levels, it may impact construction. We have addressed groundwater concerns within the earthwork and foundation design considerations section of this report.

VIII. SEISMIC SITE CLASSIFICATION AND COEFFICIENTS

Liquefaction Potential:

Whitaker Laboratory, Inc. performed a liquefaction analysis on the soils encountered within boring B-1. Liquefaction typically occurs when very loose to loose non-cohesive soils encountered below the groundwater table experience a significant loss of shear strength due to the increase in pore water pressure resulting from seismic vibrations.

The design earthquake utilized in our analysis (Charleston, SC earthquake with magnitude 7.3 and a 2% probability of exceedance in 50 years) yielded peak horizontal ground surface accelerations of 0.43g on this site.

Based upon the design earthquake and characteristics of subsurface soils, the liquefaction analysis indicated that the encountered sand stratifications present below the groundwater table have potential to liquefy during the design seismic event. The amount of settlement estimated during and shortly after a seismic event of this magnitude approximated 5 ½ inches.

Settlements of this magnitude could cause damage to the structure. If the risk of anticipated settlements due to liquefaction are unacceptable to the owner, extensive ground modification would need to be performed on the liquefiable soil strata or supporting the structure on pile foundation systems bearing below the potentially liquefiable soil zones would be required. Whitaker Laboratory should be contacted if this risk is unacceptable. Additional evaluation will be required to provide foundation recommendations capable of guarding the structure against liquefaction induced settlements.

Seismic Parameters:

International Building Code:

Assuming the structure has a period of vibration under 0.5 second and disregarding liquefaction potential, this site would be defined as a Site Class "D". The classification is determined by average soil properties in the top 100 feet of the soil profile, including standard penetration test N values, shear wave velocities, in-situ shear strengths and moisture contents, as specified by IBC 2018 & ASCE 7-10.

$$\begin{aligned}S_s &= 0.610 \\S_1 &= 0.194 \\S_{MS} &= 0.801 \\S_{M1} &= 0.430 \\S_{DS} &= 0.534 \\S_{D1} &= 0.286\end{aligned}$$

A summary report is attached in Appendix III of this report. If the period of vibration for the planned structure is in excess of 0.5 second or the size and design of this structure justifies additional investigation, a Site Specific Geotechnical Investigation and dynamic site response analysis shall be performed. Our firm has the ability to provide our clients such testing and evaluation, and we will be available to discuss the cost, and potential benefit, if any, of such if you desire.

IX. EARTHWORK AND FOUNDATION DESIGN CONSIDERATIONS

The encountered surface soils can be made suitable for shallow spread pier and/or strip footing foundations with slab-on-grade flooring if liquefaction induced settlements are not of concern to the owner and/or structural design, our foundation loading assumptions are not exceeded and the recommendations contained within this report are performed and verified during construction.

Earthwork:

- We recommend that the building site plus a minimum of 10 feet beyond the perimeter of all structural areas be stripped of any organics, stumps, roots and unsuitable organic surface soils. Stripping depths will likely require extending to depths reaching 6 to 8 inches below existing grades to remove unsuitable surface organic soils.
- Existing utilities (possible drain field) shall be removed from under the building.
- After stripping and/or utility removal, all exposed subgrade soils shall be thoroughly compacted in-place to 95% of ASTM-D-1557 and pass proof-rolling inspections prior to backfilling/filling operations begin. Areas found to pump or deflect should be undercut to a competent material and backfilled with an approved compacted material.
- Compaction efforts on all exposed subgrade soils after stripping and/or utility removal shall be made with a large vibratory smooth drum roller (Cat CS 74 or equivalent - centrifugal force range of 37,300 – 74,600 lb).
- The exposed subgrade soils within all structural areas shall be inspected, tested and approved by Whitaker Laboratory personnel prior to backfilling/filling placement begins.
- Backfill and fill material required to raise the pad and pavement areas to achieve finished subgrade elevations, should consist of granular soils and meet the requirements for material type and placement as outlined within the SITE WORK RECOMMENDATIONS section of this report.

- Please note that dense sands (100+ blow count material) were encountered at depths bracketing elevations 6 to 8 ½ feet below the ground surface on this site. Excavations that require extending below a depth of 6 feet below existing grades can prove to be difficult with standard/typical excavation equipment. Whitaker Laboratory, Inc. recommends that contractors verify capabilities of intended excavation equipment to be utilized on this site prior to bidding.

Foundations:

Once the above is accomplished, footings can be excavated. Bottom of footing excavations shall be thoroughly compacted to meet or exceed 95% of the soils modified proctor maximum dry density in accordance with ASTM-D-1557. Footing inspections should also be conducted by performing dynamic cone penetrometer testing within bottom of footing excavations to depths reaching 3 feet below bottom of footing elevation to verify adequate bearing material is present. Subsurface bearing soils deemed unsuitable based upon dynamic cone penetrometer testing should be undercut to a competent material and backfilled with an approved material.

After the above is completed and verified by Whitaker personnel during construction, footings may be designed for safe soil bearing pressures of 2000 PSF. Our technicians, prior to placing steel and concrete, should approve all footing excavations. All footings should have minimum plan dimensions of 24 inches. Bearing edges of slabs-on-grade should be a minimum of 18 inches wide. All footings, and bearing edges should reside at least 12 inches below finished grade. Overall settlements on the order of one inch should be anticipated. Differential settlement is anticipated to be on the order of ½ the overall settlement. Floor slabs can be designed utilizing a modulus of subgrade reaction "k" value of 150 pci.

Lateral loads can be resisted by passive earth pressure due to compacted structural fill placed against the sides of the footings. The upper 1-foot of resistance should be neglected unless the fill is confined by a pavement or floor slab. A soil unit weight of 110 pcf and passive earth pressure coefficient of 3.0 can be utilized in the analysis. Additionally, a friction coefficient of 0.35 between the concrete footings and underlying soil can be used in combination with passive earth pressures to resist lateral loads. The coefficient of friction should be applied to dead normal loads only.

Groundwater Recommendations:

Due to groundwater being encountered as shallow as 2 feet below the existing ground surface elevations, dewatering may be required during earthwork and/or foundation construction.

Typically, the groundwater level needs to be 24 inches below subgrade elevations to properly compact the subgrade and subsequent backfill materials. Utilizing an initial thin layer of stone compacted into the subgrade soils will help, however, dewatering may still be critical to adequately compact the subgrade, backfill and fill soils. Although dewatering techniques consisting of well point systems, sump pits with pumps, and/or drainage ditches are typically effective methods to lower groundwater, the means and methods for dewatering should ultimately be the responsibility of the contractor.

X. SITE WORK RECOMMENDATIONS

We will be pleased to discuss these recommendations with the owner and the site work contractor selected to do the work. We believe it will be beneficial to the project, for the owner and the contractor to have a clear understanding of our recommendations.

1. Prior to construction, all building areas, plus at least 10 feet on each side and all areas to be paved, should be stripped of all vegetation, topsoil and root systems. Site drainage during construction should be considered prior to this clearing and stripping. Preventing the ponding of storm water is of particular importance.
2. Topsoil, organics, root-mat and other surface materials will likely vary across the site. Individual test borings may not accurately reflect the presence of, or the thickness of such materials due to site variability and/or surfacing clearing to facilitate access for drilling equipment. Site clearing and grubbing, when unsupervised, and particularly in areas of wet soils and times of wet weather, may push organic debris into otherwise stable soils. Undercutting and clearing with a track hoe in lieu of bulldozers can minimize this.
3. Any stump holes or other depressions should be cleared of loose material and debris, and should then be back-filled with approved fill. The backfill should be placed in 6-inch thick lifts and compacted to 95% density in accordance with ASTM D-1557.
4. Any existing utilities that underlie the site should be relocated and their trenches back-filled with approved soil. The backfill should be placed in 6-inch lifts and compacted to 95% density according to ASTM D-1557.
5. Prior to fill placement, the subgrade should be proof rolled with a loaded dump truck to locate unstable or soft areas. Any unstable areas should then be investigated to determine the cause of the instability. If due to unsuitable soils, such as highly organic soils or soft clays, the areas should be undercut to firm soil and replaced with approved fill compacted in 6-inch lifts to minimum density of 95% in accordance with ASTM D-1557. If the instability is due to excess moisture in otherwise stable soil, the area should be drained and compacted to 95% density.

6. Any fill or backfill required to level or raise the site should be placed in 8 to 10 inch thick, loose lifts and compacted by appropriate compaction equipment to 95% density in accordance with ASTM D-1557.
7. All of the fill and backfill (including utility line backfill) for this project should consist of clean, free draining granular soils. The fill should be free of objectionable roots, clay lumps, organics and other debris. The fill should be readily compactable during placement. Soils classified as SW, SP, SP-SM or SM with a maximum of 15% passing a #200 sieve may be acceptable. Soils with the minus #200 fraction classified as MH, CH, OH, ML, CL or SC may be rejected. Soils with a maximum plasticity index of 25 and a maximum liquid limit 40 may be acceptable for use only beneath building pads which are situated well above the groundwater table with approval from the geotechnical engineer. Soils classified as SC or CL, exhibiting moisture sensitivity, soils with excessive clay content, or excessive moisture should not be used without approval from the geotechnical engineer. Approved sands will also need to be moisture conditioned as necessary to facilitate proper compaction throughout its entire depth. If utility trenches cannot be sufficiently dewatered to readily allow compaction of the specified pipe bedding material, then a class I (ASTM-D-2321) gravel or gravel mixture will be required.
8. To assist in reducing moisture beneath the structure, and to reduce the potential for mold growth, the site shall be graded and filled as necessary to direct drainage away from the structure. If sub drains are installed, these alone may not prevent moisture vapor beneath the structure that can cause mold growth. (Also refer to paragraph 10 below). Care must be taken to not place concrete on top of wet soils. For example, if fill or natural soils experience heavy rain, the soils should be properly drained and dried, prior to placement of concrete. Otherwise moisture migration through the slab will occur.
9. Compact all footing excavations and slab subgrades to a minimum density of 95% in accordance with ASTM-D-1557, prior to placement on concrete. The footing excavations, and all prepared slab subgrade, should be maintained in a dry and compacted condition until the concrete is placed. Areas that are softened by water or that are disturbed by construction activity should be re-worked, re-compacted, or appropriately repaired to the required bearing and density. If necessary, stone backfill or other corrective measures may be implemented to stabilize footings.
10. All slabs-on-grade should be supported on a minimum of 4-inches of granular, free-draining gravel or coarse sand to reduce moisture migration by capillarity. A vapor retarding membrane, overlying this granular base, is recommended to further reduce moisture migration into finished areas of the structure. Note that the use of these measures will not totally prevent moisture under or on top of slabs or beneath structures. (Also refer to paragraph 8 above).

11. Any footing excavations that are directly adjacent to the existing foundations should be done in small increments to avoid undermining them and causing a loss of support to the existing structure. If necessary, the excavations should be sheeted and braced or grouting should stabilize the soil in the immediate area.

XI. PAVEMENT RECOMMENDATIONS

Subgrade for driveways and parking areas should consist of a minimum of 24-inches of clean sand subgrade compacted to a density of 95% of its maximum dry density as determined by ASTM-D-1557. Pavement designs should also provide a minimum of 24-inches separation between the bottom of the base course material and the seasonal high ground water table. Undercutting, re-compacting, and/or replacing of existing surface soils will be required unless subgrade consists of organic free, virgin sandy soils that are proven to be a minimum of 24-inches thick, 24-inches above the seasonal high ground water table, compacted to 95% of ASTM D-1557 and passes a proof-roll. Final grades and elevations will determine the extent of any filling, undercutting and backfilling that may be required. The pavement design must provide for the pavement subgrade soils to drain and not ever become saturated by surface water, perched groundwater or groundwater table.

Due to groundwater residing as shallow as 2 feet below existing grades, Whitaker recommends bottom of pavement sections reside at or above existing ground surface. As long as bottom of pavement section elevation reside at or above the existing ground surface elevation, combined with near surface soil conditions consisting of sandy soils on this site, the in-situ sandy soils can be made suitable for use as pavement subgrade material as long as the in-place sandy soils are compacted for a full 24-inch depth below bottom of pavement section elevations. In addition, the use of under drains should not be necessary as long as bottom of pavement section elevations do not reside below existing ground surface elevations.

If site grades are not raised as recommended, underdrains should be incorporated in the pavement design to permanently maintain groundwater 2 feet below bottom of pavement section elevation. These systems should be provided below and/or adjacent to the pavement section. Depending on the pavement section (crown, inverted crown, curb & gutter) and depending on adjacent landscaping, islands, medians, or irrigation sprinkler plans; under drains may need to be provided along the centerline, at the low point, on both sides of the pavement, adjacent to all curb, adjacent to all irrigated areas and/or along the entire perimeter of all parking areas.

Perforated under-drain pipe shall be enclosed in a filter fabric sock or fabric wrapped rock filled trench, and then surrounded by a zone of fabric compatible granular backfill. Due to variations in such commercially available filter fabrics and filter socks, in order to minimize clogging of the fabric pores and passing of fines into the drain systems, a submittal from the manufacturer of the proposed fabric product, to the site civil engineer, must identify compatible granular backfill soils by grain size distribution. Such submittal shall necessarily include the pore sizes of the filter fabric. Based upon our experience a non-woven (6 to 8 oz) filter fabric works well for soil types in this area.

Under drains should be designed to promote continuous positive drainage away from the pavement area and day-lighted to a drainage feature that will not restrict or back up the flow of water. The site design will require setting pavement grades, pond elevations and/or drainage features to accommodate gravity flow under drains with invert elevations residing a minimum of 4 feet below existing grades.

As mentioned above, compaction efforts on exposed subgrade soils (after stripping) shall be made with a large vibratory smooth drum roller (Cat CS 74 or equivalent - centrifugal force range of 37,300 – 74,600 lb).

All proof rolling, construction observations, compaction testing of paved areas must be in accordance with the SITE WORK section above.

If a rain event of 0.5 inches or more, occurs after initial proof rolling and prior to subsequent placement of base or surface wearing course, the proof roll testing must be repeated just prior to additional work.

The below recommended pavement sections should be considered standard and typical for the area. We have not been provided traffic data and/or been instructed to perform CBR testing on subgrade soils, therefore these pavement sections should not be considered a pavement design. The below recommended pavement sections are based upon the assumption that the sandy subgrade soils will yield a minimum CBR value of 8 if compacted to 95% ASTM D-1557 for a full 24-inch depth. In addition, the below recommended light duty pavement sections should be considered for car traffic areas only. Below recommended heavy duty sections should be utilized for all areas receiving truck traffic (delivery trucks and garbage trucks with 18-kip axle loads). In addition the heavy duty sections recommended below are for low volume truck traffic (15 to 20 trucks per day).

LIGHT DUTY PAVEMENT (CARS & LIGHT TRUCKS)

SUBGRADE: Minimum – 24-inches of drained, compacted, coarse grained soil
BASE COURSE: Minimum - 6 inches of graded aggregate base course
SURFACE COURSE: Minimum - 2 inches of Hot Mix Asphalt Surface Course Type B

HEAVY DUTY PAVEMENT (LOADED TRUCKS WITH 18+ kip AXLE LOADS)

SUBGRADE: Minimum – 24-inches of drained, compacted, coarse grained soil

BASE COURSE: Minimum - 8 inches of graded aggregate base course

BINDER COURSE: Minimum - 2.0 inches of Hot Mix Asphalt Binder Course Type B

SURFACE COURSE: Minimum - 2.0 inches of Hot Mix Asphalt Surface Course Type B

In all projects, a minimum mat temperature of 185° F must be maintained through final roller pass.

Please note that specifications for above mentioned base course, binder course and surface course can be found under division 300, 402 and 403 respectively of the South Carolina Department of Transportation Standard Specification for Highway Construction, Edition of 2000. The mix design must include "lime".

All testing procedures, pavement densities, void ratios, and all criteria for final pavement approval must be agreed upon by the parties after completion of a rolling pattern or test strip segment. It must also be agreed that the reference to SCDOT Specifications shall mean the entirety of the specification. Portions of such Standard State pavement specifications are not stand alone provisions, and must be considered as mutually complementary provisions, to be used in their entirety. Selected portions of the Standard State specifications may be included, only after completion of a rolling pattern or test strip segment, and the agreement of the parties.

Several studies have shown that recycled concrete aggregates may have suitable physical and geotechnical properties for road construction; however, the studies related to leaching behavior and potential clogging have not been investigated in depth. Whitaker Laboratory recommends that recycled concrete aggregate and/or recycled masonry materials should not be used in project designs and construction where geotechnical fabrics are part of a drainage filter design. Such recycled materials have the potential for precipitating calcium-based compounds and causing clogging of the fabric filter materials

PORTLAND CEMENT CONCRETE PAVEMENT

HEAVY DUTY: 8-inches of Portland cement concrete with minimum compressive strength of 4000 PSI.

LIGHT DUTY: 5-inches of Portland cement concrete with minimum compressive strength of 4000 PSI.

Whitaker Laboratory recommends incorporating a minimum of 4-inches of graded aggregate base course below the above concrete pavement sections for maintaining a smooth and level surface during placement of the pavement section.

Joints must be placed a MAXIMUM spacing in FEET of 2.5 times the pavement thickness in inches, and in no case more distant apart than 15 feet.

Pavement Design should include:

- Requirements to seal all pavement joints to prevent surface water entry into base / subgrade. Such provision should minimize pumping failures at joints.
- Requirements that pavement sections and panels subject to repetitive braking and/or acceleration should be designed with lug anchors or tie-bars to minimize separation or misalignment at the joints.
- Provisions for load transfer across construction joints by dowels or other acceptable means.
- In general, the design should follow the recommendations and practices for all components as described in ACI 330.1 and/or ACI 330R as applicable.

XII. QUALITY CONTROL AND TESTING

Documented inspections and/or testing performed by Whitaker Laboratory personnel, at the following critical milestones during construction, will be required for the recommendations contained within this report to be validated:

Earthwork:

- After stripping and prior to backfill or fill placement: Perform density testing and proofrolling on exposed subgrade soil to verify exposed subgrade soils are compacted and stable enough to begin receiving backfill and/or fill.
- Collect sample of proposed backfill & fill material, perform laboratory testing and determine suitability for use (approve or disapprove).
- During backfill/fill placement: Perform density testing on each lift of backfill and/or fill soil.

Footings:

- Once footings are excavated: Perform inspection on bearing subgrade soils within bottom of footing excavations to depths reaching 3 feet below bottom of footing elevation prior to placement of reinforcing steel or concrete. Provide recommendations for undercutting and replacement if deemed necessary.

At the appropriate time, please contact Whitaker Laboratory, Inc. for budgetary and scheduling purposes for the performance of the above required inspection and testing services.

We further offer concrete, asphalt, masonry, and structural steel inspections and testing. Whitaker Laboratory, Inc. also performs observational services for mold mitigation, including observation of installation of vapor retarding membranes, subdrains, overall site drainage, and regularly scheduled observations after construction of site and landscape drainage, and monitoring of humidity and moisture in slabs and basement walls.

XIII. QUALIFICATIONS OF REPORT

Any recommendations or opinions offered in this report are based on our interpretation of the data obtained from this investigation. It should be noted that underlying subsurface and soil conditions can, and do, vary considerably within short lateral distances. Regardless of the thoroughness of any subsurface investigation, it is possible that conditions may be revealed between boring locations that are different from those found by our borings and used for our analysis. For this reason, we recommend that the site preparation and foundation construction for this project be monitored closely. If deviations of the soil conditions from those presented in this report appear, we will be glad to furnish any additional analyses and recommendations that may be required.

This report was made to investigate subsurface properties of the site and is not intended to serve as a wetlands survey, toxic mold assessment, or environmental site assessment. No effort has been made to define, delineate, or designate any area as wetlands or an area of environmental concern or contamination. Any references to low areas, poorly drained areas, etc. are related to geotechnical applications. Any recommendations regarding drainage and earthwork are made on the basis that such work can be permitted and performed in accordance with the current laws pertaining to wetlands, storm water runoff, and environmental contamination.

This report does not attempt to define or represent any FEMA, or otherwise designated, flood, erosion, scour, or other hazardous zones; nor does it presume to reflect that governmental or other authorities will grant approval of the project and issue appropriate permits.

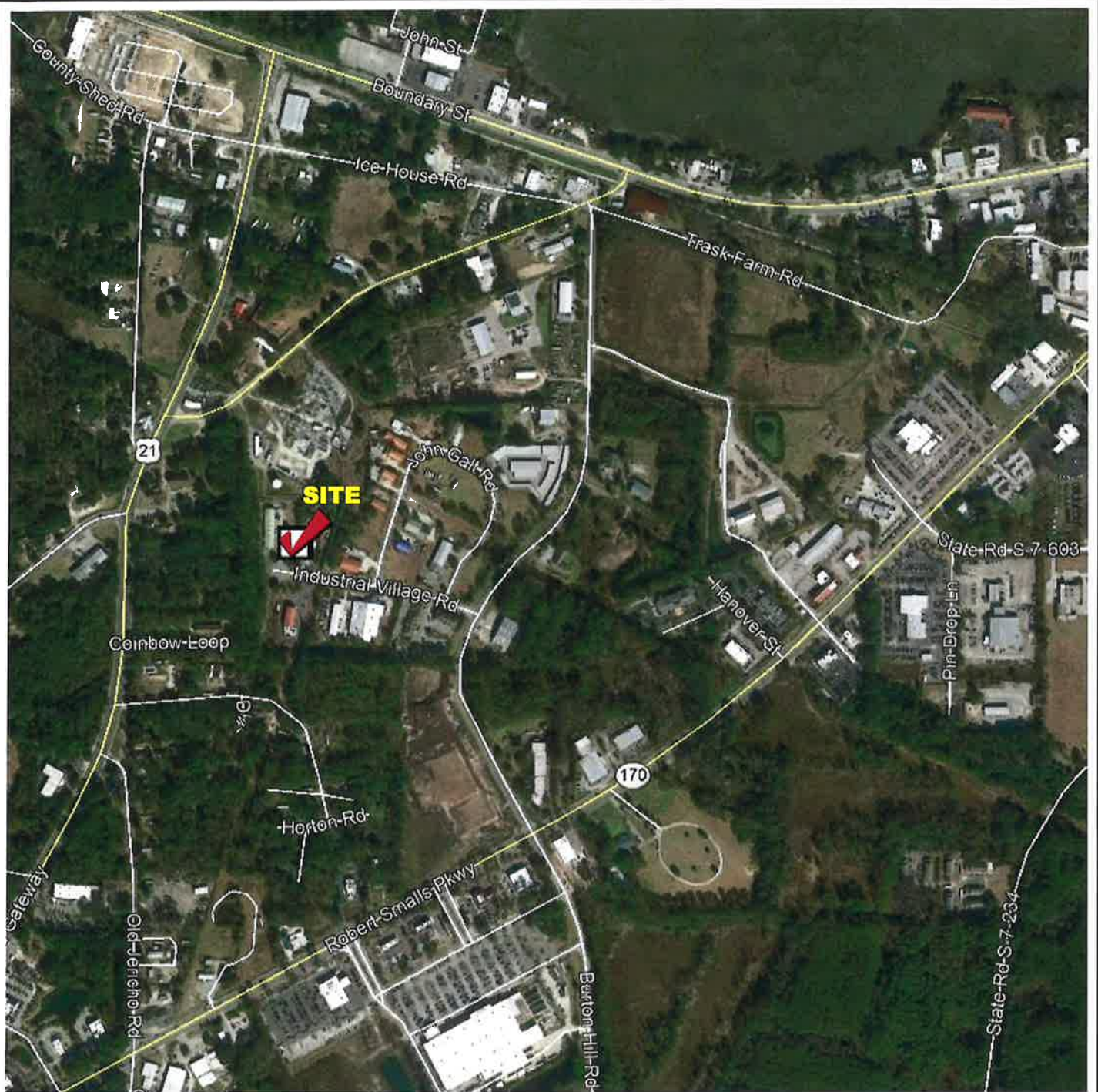
WARRANT: WHITAKER LABORATORY, INC. and its professional engineers strive to perform all services in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering profession practicing in the same locality and under similar conditions. No other warranty or representation, expressed or implied, is included or intended in this agreement, in any report, opinion, document, or otherwise.

We carry commercial general liability insurance, including completed operations, and professional liability insurance in aggregate amounts deemed adequate, and we comply with the statutory requirements for workmen's compensation insurance. Accordingly, by accepting and relying on the contents of this report, the liability of WHITAKER LABORATORY, INC. and its professional engineers, to the client, owner, or any other party, for any loss or damage, resulting from any cause, including professional acts, errors, omissions, negligence, toxic mold and other environmental claims, breach of warranty or breach of contract, shall not exceed the total compensation received by us for services related to this project; and client will defend, settle, and discharge any claims or allegations of liability for same against us by others. If client desires higher monetary limits of our liability, we will be pleased to discuss such higher limits and the impact on liability and fees.

In the event the client makes a claim against us, at law or otherwise, for any alleged act, error, omission, negligence, breach of warranty or breach of contract, arising from the performance of our services, it is mutually agreed that initially, the client and Whitaker Laboratory, Inc. will attempt to resolve such dispute through direct negotiations between the appropriate representatives of each party. Secondly, if such negotiations are not fully successful, the parties agree to resolve any remaining disputes by formal nonbinding arbitration mediation in accordance with the rules and procedures to be agreed upon by the parties. Mediation is a pre-condition to litigation. The exclusive venue for any disputes relating to Whitaker Laboratory's service shall be in Chatham County, GA. Furthermore, if the client fails to prove such claim, then client shall pay all costs accrued by us in defending ourselves.

TITLE: The ownership of opinions, technical ideas, methods and means, drawings, calculations, and other data developed by us during the course of preparing proposals or rendering engineering services remains exclusively with us. It is a condition of this report or proposal that the client agrees not to use the opinions, technical ideas, methods and means, drawings, calculations or any other data for projects or locations, other than those specifically addressed in the report, and that no one other than the client may use this report, without the written permission of WHITAKER LABORATORY, INC.

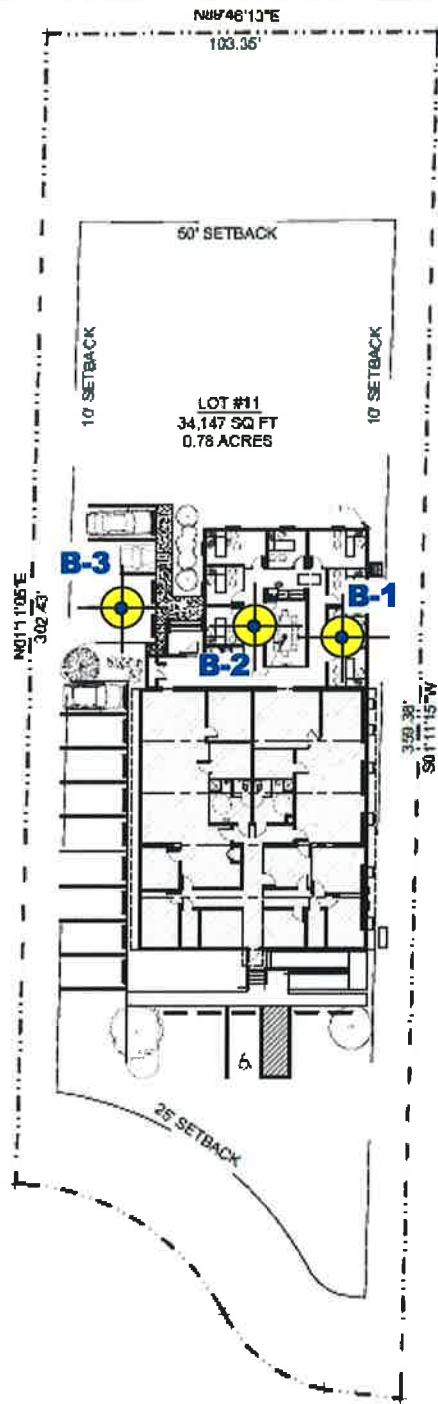
APPENDIX I
SITE VICINITY & BORING LOCATION PLANS



Site Vicinity Map

Proposed Beaufort County DNA Laboratory Addition
111 Industrial Village Road
Beaufort, South Carolina





Boring Location Plan

Proposed Beaufort County DNA Laboratory Addition
 111 Industrial Village Road
 Beaufort, South Carolina



ALL BORING LOCATIONS ARE APPROXIMATE, & ARE BASED ONLY ON FIELD ESTIMATES.



APPENDIX II
BORING RECORDS

Client: Beaufort Design Build LLC

Boring No. B-1

Project: Beaufort County DNA Laboratory Addition

Date: 4/21/20

Location: 111 Industrial Village Road - Beaufort, SC

Engineer: Follo

SUBSURFACE PROFILE		Sample		Standard Penetration Test blows/ft. (Corrected to N60) 10 20 30 40 50 60 70 80 90	Water Table	Remarks
Depth	Description	Depth	Blows/ft			
0	Ground Surface	0				
	SM-PT Topsoil	1	8	8		
	SP-SM Loose, brown fine sand	2	13	13		
	SP-SM Firm, tan-orange fine sand	5	8	8		
	SP-SM Loose, dark brown fine sand	4	100	100		
	SP-SM Dense, brown fine sand	10	49	49		
	SP-SM Dense, brown fine sand	15	8	8		
	SP-SM Loose, tan fine sand	15	8	8		
	SM Very loose, gray fine silty sand	20	3	3		
		25	4	4		
	SP-SM Firm, gray fine sand	30	22	22		
		35	17	17		
	End of Borehole	35	17	17		
40		40				

Drilled By: Wilkerson (B48)

WHITAKER LABORATORY, INC.

Hole Size: 6.5"

Drill Method: H. S. Auger

2500 Tremont Road
Savannah, GA 31405

Datum:

Drill Date: 4/21/20

Sheet: 1 of 1

APPENDIX III
SEISMIC PARAMETERS

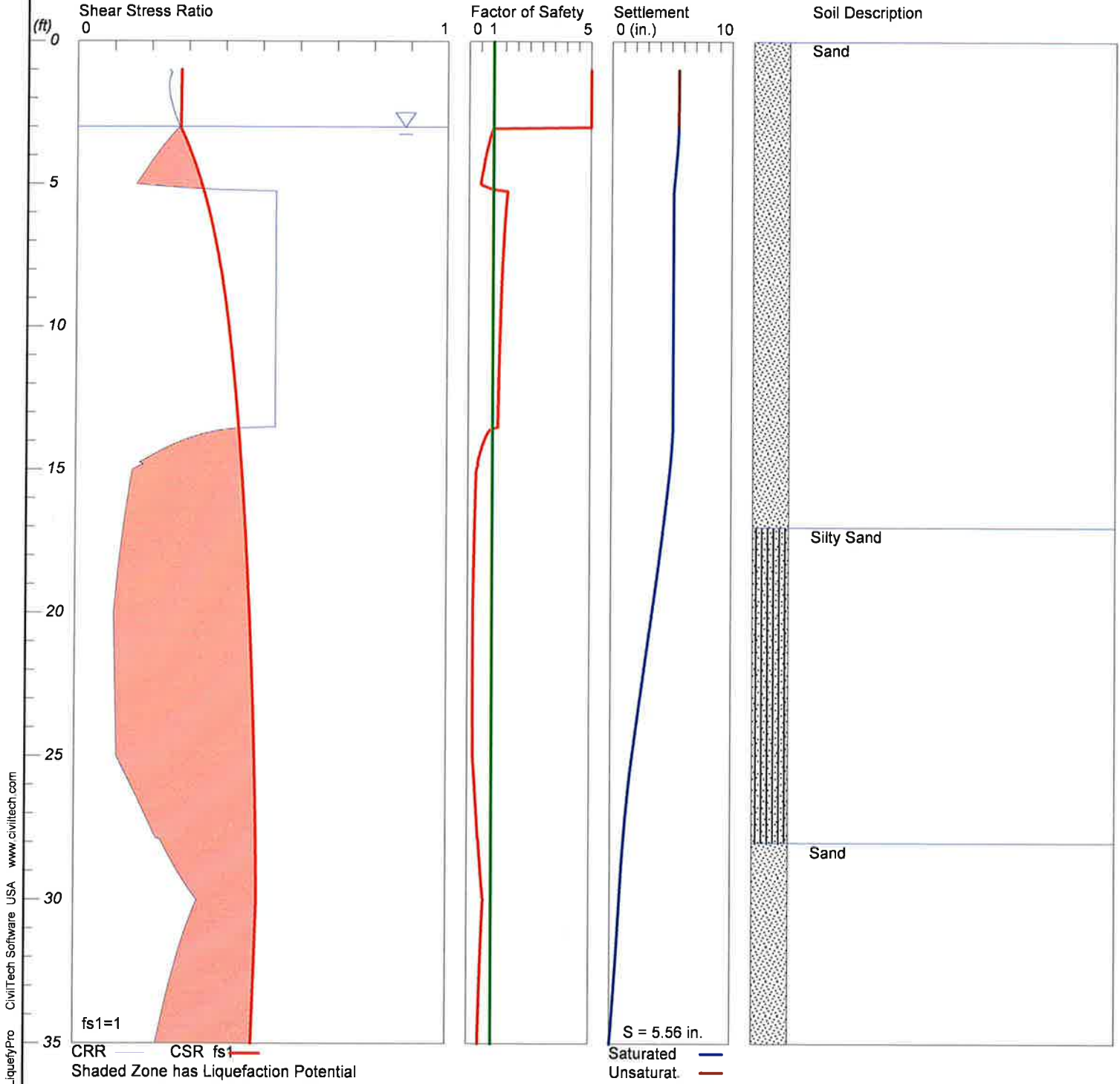
LIQUEFACTION ANALYSIS

Laboratory Addition

Hole No.=CPT-1 Water Depth=3 ft

Ground Improvement of Fill=1 ft

Magnitude=7.3
Acceleration=0.43g





Beaufort County Laboratory Addition, Beaufort, SC

Latitude, Longitude: 32.4351, -80.7211



Google

Map data ©2020

Date	4/24/2020, 8:09:37 AM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	D - Stiff Soil

Type	Value	Description
S_S	0.61	MCE_R ground motion. (for 0.2 second period)
S_1	0.194	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.801	Site-modified spectral acceleration value
S_{M1}	0.43	Site-modified spectral acceleration value
S_{DS}	0.534	Numeric seismic design value at 0.2 second SA
S_{D1}	0.286	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	D	Seismic design category
F_a	1.312	Site amplification factor at 0.2 second
F_v	2.211	Site amplification factor at 1.0 second
PGA	0.352	MCE_G peak ground acceleration
F_{PGA}	1.248	Site amplification factor at PGA
PGA_M	0.439	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
S_{sRT}	0.61	Probabilistic risk-targeted ground motion. (0.2 second)
S_{sUH}	0.672	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
S_{sD}	1.5	Factored deterministic acceleration value. (0.2 second)
S_{1RT}	0.194	Probabilistic risk-targeted ground motion. (1.0 second)
S_{1UH}	0.211	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S_{1D}	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.908	Mapped value of the risk coefficient at short periods
C_{R1}	0.923	Mapped value of the risk coefficient at a period of 1 s

DISCLAIMER

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APPENDIX IV
IMPORTANT GENERAL NOTES

GENERAL NOTES

The "standard" penetration resistance is an indication of the density of cohesion less soils and of the strength of cohesive soils. The "standard" penetration test is measured with a 1.4 inch I.D., 2 inch O.D., sampler driven one (1) foot with a 140 pound hammer falling 30 inches.

RELATIVE DENSITY OF SOIL THAT IS PRIMARILY SAND

Number of Blows	Relative Density
0 - 4	Very loose
5 - 10	Loose
11 - 20	Firm
21 - 30	Very firm
31 - 50	Dense
Over 51	Very dense

CONSISTENCY OF SOIL THAT IS PRIMARILY SILT OR CLAY

Number of Blows	Consistency
0 - 2	Very soft
3 - 4	Soft
5 - 8	Firm
9 - 15	Stiff
16 - 30	Very stiff
Over 31	Hard

While individual test boring records are considered to be representative of subsurface conditions at the respective boring locations on the dates shown, it is not warranted that they are representative of subsurface conditions at other locations and times.

The subsoil stratification shown on these profiles is not warranted but is estimated based on accepted soil engineering principles and practices and reasonable engineering judgment.

Unless notified, samples will be disposed of after 60 days.

GROUP

MAJOR DIVISIONS SYMBOLS TYPICAL NAMES

COARSE-GRAINED SOILS

More than 50% retained on No. 200 Sieve*

GRAVELS

50% or more of coarse fraction retained on No. 4 sieve

CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
GRAVELS WITH FINES	GM	Silty gravels, gravel-sand-silty mixtures
	GC	Clayey gravels, gravel sand clay mixtures

SANDS

More than 50% of coarse fraction passes No. 4 sieve

CLEAN SANDS	SW	Well graded sand and gravelly sands, little or no fines
	SP	Poor graded sands and gravelly sands, little or no fines
SANDS WITH FINES	SM	Silty sands, sand-silt mixtures
	SC	Clayey sands, sand clay mixtures

FINE GRAINED SOILS

50% or more passes No. 200 Sieve*

SILTS AND CLAYS

Liquid Limit 50% or less

ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
OL	Organic silts and organic silty clays of low plasticity

SILTS AND CLAYS

Liquid Limit greater than 50%

MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
CH	Inorganic clays of high plasticity, fat clays
OH	Organic clays of medium to high plasticity

HIGHLY

ORGANIC SOILS

PT	Peat, muck and other highly organic soils
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*Based on the material passing the 3 in. (75 mm) sieve.

SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division 00 and 01 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

- B. Concrete reinforcement includes all labor, materials, and equipment necessary and required to detail, fabricate, and place reinforcement and accessories for all cast-in-place concrete work indicated on the drawings.
- C. Extent of work shown on drawings includes, but is not limited to, reinforcing bars, welded wire fabric/mat, ties, hoops, accessories, and supports.
- D. Cast-In-Place Concrete is specified in another Division 03 section. Reinforced Masonry Work are specified in another Division 04 section. Concrete pavements/walks are specified in Division 32 sections.

1.3 QUALITY ASSURANCE:

- A. Codes and Standards: Comply with most recent version (unless specifically noted otherwise) of all applicable provisions of state and local building and safety codes and all other codes referenced therein, other federal (OSHA) safety requirements, and other codes and standards referenced in this specification, except where more stringent requirements are indicated or specified herein.
 - 1. ACI 301-14 "Specifications for Structural Concrete for Buildings".
 - 2. ACI 318-14 "Building Code Requirements for Reinforced Concrete".
 - 3. ACI SP-66 "Detailing Manual for Reinforced Concrete".
 - 4. ACI 117 "Standard Specifications for Tolerances for Concrete Construction and Materials".
 - 5. ACI SP-15 "Field Reference Manual", provide copy in field office.
 - 6. CRSI "Manual of Standard Practice", latest edition.
 - 7. CRSI "Placing Reinforcing Bars", latest edition.
 - 8. AWS D1.4 "Structural Welding Code - Reinforcing Steel".
- B. Inspection and Testing: Owner will employ, at his expense, an independent testing laboratory to perform quality assurance program which will include, but shall not be limited to the following testing/reports:
 - 1. Verify that reinforcing materials and accessories comply with the requirements of the drawings, specifications and referenced standards.
 - 2. Verify that in place reinforcing complies with referenced standards and as indicated on the drawings prior to closure of formwork or placement of concrete where no formwork is required for:
 - a. Size, number, grade, and spacing of reinforcing bars
 - b. Clear concrete cover requirements around reinforcing
 - c. Proper placement with respect to structural and shop drawings
 - d. Proper lap splice length and spacing

- 1) Where mechanical bar splices are used, verify approved splicing devices are used and properly installed. Verify proper location of splicing devices, including where staggered splices are required.
- 2) Where mechanical bar splices are used at face of forms, verify that splicing devices are adequately physically attached to formwork to assure proper location after concrete placement and verify adequate protection for ends of splicing devices from concrete during pours.
 - e. Inspect welded splices for weld qualities
 - f. Proper fabrication of required reinforcing details
 - g. Proper use of supports, accessories, and tying of reinforcement
3. Provide written reports to architect and structural engineer recording any materials, tests, placements, or processes not in conformance with the Construction Documents. Inform contractor immediately of all non-conformities. Verify that contractor has made all necessary corrections.
4. Inspections or testing ordered by and/or performed for Contractor's convenience shall be sole responsibility of Contractor.

1.4 SUBMITTALS:

- A. General: Contractor shall establish and provide a mutually agreed upon "Submittal Schedule" prior to beginning transmission of submittals for review. There is no requirement for the Architect or Structural Engineer to process or review any submittals prior to this Schedule being established and distributed to all relevant parties involved in Submittal preparation, processing, and review.
 1. Schedule shall identify and indicate individual packages, submittal dates, and required return dates. Dates shall be the date that the submittal is scheduled to arrive in the Structural Engineer's office for review to begin and the date that the returned submittal is required to arrive in the Contractor's office for distribution to his sub-contractors and fabricators.
 2. Scheduled review and return of submittals/shop drawings shall be based on a **MINIMUM of FOURTEEN (14) working days** in the Structural Engineer's office from receipt of submission to return to the next party for their action.
 3. Shop drawings should be submitted incrementally as appropriate packages are prepared to equalize the workload for review of the drawings and expedite the return schedule. Submission of a large volume of shop drawings at one time may result in review times that will be required to exceed those noted above. Definition of a "large volume" of shop drawings is subject to mutual interpretation.
 4. Contractor shall provide in his Schedule for the above noted time and for appropriate additional time for delivery (shipping) of drawings. No claims may be made on the part of the Contractor for delay of the project due to shop drawing reviews that occur within the above stated time limits or for reviews that take greater time than noted above due to submission of a large volume of shop drawings at one time.
- B. Product Data: Manufacturer's product data with application/installation instructions for proprietary materials/items, and others as requested by Architect/Structural Engineer. Submit samples to the Structural Engineer for all reinforcing accessories proposed for use.
- C. Material Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by Architect/Structural Engineer. Certificates shall be signed by manufacturer/Contractor certifying each material item complies with, or exceeds specified requirements.
- D. Mill Certificates: Submit mill certificates signed by producer and Contractor for following reinforcing grades: ASTM A-615 Grade 60S (specified for bendability), ASTM A-706 (specified for ductility/weldability), and for **ALL** reinforcing with yield strengths greater 60 KSI.

- E. Substitutions: Any request for product or material substitution must be submitted for review, with all necessary documentation, a minimum of ten (10) days prior to time of bid. No requests for substitutions will be considered after bids have been received.
- F. Shop Drawings: Submit drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI detailing manual (SP-66) showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required at openings through concrete structures. Include all accessories specified/required to support reinforcing.
1. Submit full scale electronic PDF files of each shop drawing for review via email or FTP download. PDF files shall be generated from original CAD drawing files with multiple drawings contained in a single PDF file.
 - a. Contractor shall reimburse the Structural Engineer at the rate of \$2.00 per drawing for costs of plotting/printing out the submittals for review.
 - b. Structural Engineer's review comments only will be returned via electronic PDF "Submittal Review Memorandum". Shop drawings proper will not be returned except in instances where graphical markup is necessary to convey the intent of the engineer's review comments.
 2. Reproducible copies of contract documents **shall not** be used as shop drawings without prior written indemnification with respect to items for which the Contractor alone is responsible.
 3. Contractor shall employ technically competent staff to thoroughly review the shop drawings prior to submission. Shop drawings not demonstrating competent preparation or understanding of the Contract Documents both drawings and specifications (i.e. containing numerous errors and/or omissions or prepared using incorrect versions of the contract documents) shall not be forwarded to the Architect/Structural Engineer but shall be returned to the source for correction following the Contractor's review.
 4. Drawings shall bear Contractor's approval stamp accepting responsibility for coordination of dimensions shown in the contract documents, quantities and coordination with other trades. Drawings not bearing Contractor's stamp or not showing evidence of being reviewed by a technically competent representative (due to the magnitude of submitted errors) may be rejected at the discretion of the Architect or Structural Engineer.
 5. Shop drawings rejected due to non-compliance with the structural documents shall be resubmitted with the same time requirements for review as a new submittal as noted above. No claims may be made on the part of the Contractor for delay of the project due to shop drawings rejected due to non-compliance with the structural documents. Such delays, if they occur, shall be attributable entirely to the Contractor's Fabricator.
 6. Shop drawings submitted for more than two reviews due to fabricator's non-compliance shall result in time for additional engineering services being charged to the Contractor.
- G. Changes and Deviations: After review, neither products nor construction requirements indicated on the shop drawings may be changed or deviated from. Changes following shop drawing review may be requested by the Contractor in writing, separate from shop drawings and shall clearly delineate requested change. Contractor shall not proceed with any requested changes until notified by Architect/Structural Engineer, in writing, of acceptability.

PART 2 - PRODUCTS

2.1 REINFORCING MATERIALS:

- A. General: Reinforcing bars and welded fabrics and their supports shall be **domestic new billet steel (American or Canadian)** as shown on structural drawings.
- B. Reinforcing Steel: Deformed reinforcing bars shall conform to the following:
1. ASTM A-615 Grade 60 deformed - typically, U.N.O.

2. ASTM A-615 Grade 60S deformed - where field bending of reinforcement is required/intended
3. ASTM A-706 Grade 60 deformed - where welding and/or field bending is required
- C. Smooth Steel Wire: ASTM A-82 Grade 70 where indicated on the drawings for use in columns or other elements as spiral reinforcement.
- D. Deformed Steel Wire: ASTM A-496 Grade 70 deformed, where noted on the drawings for use in masonry joints as column/pilaster reinforcing bar ties or horizontal wall reinforcing.
- E. Welded Steel Wire Mat: ASTM A-184, minimum yield strength of 65 KSI, welded wire mat (flat sheet).
- F. Welded Deformed Steel Wire Mat: ASTM A-497, minimum yield strength of 65 KSI, welded deformed wire mat (flat sheet).
- G. Deformed Bar Anchors: ASTM A-496, minimum yield strength of 75 KSI, substitution of Grade 40 or 60 reinforcing bars is prohibited.
- H. Headed Deformed Bar Anchors (Terminators): ASTM A-970, welded, swaged, or threaded head device, permissible for reinforcing bars with maximum bar strength not exceeding 60 ksi. Product shall comply with ACI 318-08 Section 12.6.
- I. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, and welded wire fabric/mat in place. Use wire bar type supports complying with CRSI recommendations.
 1. For slabs-on-grade, use supports with sand plates or horizontal runners. Supports of solid brick or masonry for support welded wire fabric are **PROHIBITED** in all slabs on grade. See details for location of WWF within slab.
 2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

2.2 SPLICING DEVICES:

- A. Tension Splices: Where noted on the drawings or at the contractor's option where not noted on the drawings reinforcing shall be spliced with mechanical coupling devices developing minimum 125% of the reinforcing yield strength in tension. Vertical reinforcing bar ends shall be shear cut, saw cut, or flame cut. Devices shall be approved by the International Code Council Engineering Services and shall have the ICC-ES ESR submitted for review. Subject to compliance, one of the following:
 1. "Cadweld-Series C" by Erico Products, Inc.
 2. "Lenton Coupler" by Erico Products, Inc.
 3. "Lenton Form Saver" by Erico Products, Inc.
 4. "NMB Splice Sleeve" by Splice Sleeve Japan, Ltd.
 5. "Dywidag Threadbar Coupler" by Dickerhoff and Widmann, Inc.
 6. "No Slip" by Fox-Hewlett Industries
- B. Compression Splices: Vertical bars with end bearing compression splices shall have finished ends saw cut or milled for true bearing. Bar ends shall be finished flat surfaces to within 1 1/2 degrees of 90 degrees to the bar axis. Bars shall be concentrically fitted by an acceptable device to within 3 degrees of full contact bearing in completed splice. Devices shall be approved by the International Code Council Engineering Services and shall have the ICC-ES ESR submitted for review. Subject to compliance, one of the following:
 1. "Speed Sleeve" by Erico Products, Inc.
 2. "G-Loc" by Gateway Building Products
 3. "Pre Set" by Stricon Products Ltd.

- C. Dowel Bar Replacement (Inserts): Where noted on the drawings or at the contractor's option where not noted on the drawings reinforcing crossing construction joints shall be spliced with mechanical coupling inserts cast flush against the form and using dowels connected to the insert for subsequent concrete placement. Inserts shall develop a minimum of 125% of the reinforcing yield strength in tension. Devices shall be approved by the International Code Council Engineering Services and shall have the ICC-ES ESR submitted for review. Subject to compliance, one of the following or approved equal:
1. "Lenton Form Saver" insert and threaded dowel by Erico Products, Inc.
 2. "Dowel Bar Splicer" (DB-SAE) by Richmond Screw Anchor Co., Inc.
 3. "Dywidag Extruded Coupler Splice for Reinforcing Bars", by Dywidag Systems International USA, Inc.

PART 3 - EXECUTION

3.1 FABRICATION AND DELIVERY:

- A. Fabricate reinforcing as detailed with indicated sizes. Cut/bend/form to required lengths, shapes, and assemblies without causing damage or kinks to the reinforcing steel. Reinforcement **SHALL NOT** be heated for the purpose of bending or otherwise fabricating the bars.
- B. Bundle and tag reinforcement with information to identify reinforcing for proper placing. Transport to and store at site to avoid damaging or covering reinforcing with grease, mud, or other deleterious materials.

3.2 PLACING REINFORCEMENT:

- A. Comply with CRSI 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, mud, dirt, dust, ice, and other materials that reduce or destroy bond with concrete.
- C. Accurately position/support/secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required. Bricks or other masonry are **NOT PERMITTED** for use as supports for reinforcing in footings or grade slabs.
- D. Place reinforcement to obtain no less than the 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 so ends are directed into concrete, not toward exposed concrete surfaces.
- E. Welded Wire: Install welded wire fabric in longest lengths practicable. Lap adjoining pieces 1'-0" but at least one and one-half (1 1/2) full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.
- F. Place specified moisture barrier or waterproofing membrane as indicated on the drawings, prior to placing steel for slabs on grade.

3.3 JOINTS:

- A. Construction Joints: Continue reinforcement through construction joints or where detailed on the shop drawings provide dowels to develop required tension or compression. Include specified additional shear friction reinforcing. Shop drawings **MUST** reflect all construction joints, continuity of reinforcing through construction joints (either continuous reinforcing or by mechanical splicing devices), and specified shear friction reinforcing. Rebar shop drawing not reflecting these items will be rejected.

- B. Additional Reinforcing: Provide additional reinforcing at all sleeves/openings in beams/slabs/walls as indicated or detailed on the drawings. Where sleeves/openings not detailed/shown on the drawings interrupt required reinforcing and details are not provided, cease work until the Architect/Structural Engineer provides details or direction. Additional cost incurred for corrective action, including Architect/Engineer's fees shall be responsibility of the Contractor.
- C. Terminating Reinforcing: All reinforcing terminating at the tops of columns and pilasters shall be hooked, unless noted otherwise on the drawings.

3.4 SPLICES:

- A. General: Provide required splicing devices as indicated on the drawings. Splice reinforcing steel only at locations as indicated on the drawings. The Structural Engineer may approve other splice locations.
- B. Lap Splices: Full contact lap splices are required for all reinforcing where lap splices are indicated, unless detailed otherwise on the drawings.
 - 1. Refer to the drawings for splice/lap lengths required for each bar size/grade and for each concrete strength class/density.
- C. Welded Splices: Welding of reinforcing steel is **PROHIBITED** unless explicitly detailed on the drawings or approved in writing by the Structural Engineer.
- D. Where permitted, welding shall conform to AWS D1.4 "Structural Welding Code - Reinforcing Steel". Reinforcing steel conforming to ASTM A-706 or deformed bar anchors conforming to ASTM A-496 is **REQUIRED** in all locations where manual or machine welding is to be performed.
- E. Welding of all other reinforcing steels is **PROHIBITED** except for "Cadweld" tension splices as specified. "Tack" welding of reinforcing is **PROHIBITED** in any and all cases.

3.5 MISCELLANEOUS REINFORCING STOCKPILE:

- A. General: The Contractor shall stockpile on site the sizes and quantities of reinforcing shown on the drawings for use for this project solely at the discretion of the Structural Engineer. This reinforcing is to be used to expedite the progress of the project when conditions arise for which reinforcing is not otherwise available at the jobsite.
 - 1. Use of this reinforcing shall not be charged against the Owner's cost for the work unless the reinforcing was included in work not shown on the contract documents.
 - 2. Contractor shall reimburse the Owner in accordance with the requirements indicated on the drawings for all unused reinforcing at the conclusion of the project.

END OF SECTION 03 20 00

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division 00 and 01 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

- A. Cast-In-Place Concrete work includes all labor, materials, and equipment necessary and required to coordinate formwork, reinforcing, accessories, and to place all cast-in-place concrete work.
- B. Extent of work to be performed and/or coordinated is shown on drawings and indicated in the specifications including, but not limited to foundations, walls, columns, beams, slabs, stairs, curbs, equipment pads, fill slabs on metal decking and metal stair pan fill. Coordination with other work includes, but is not limited to, of formwork, reinforcing, and placement of embedded items.
- C. Concrete Reinforcement is specified in another Division 03 section. Reinforced Masonry Work is specified in another Division 04 section. Concrete pavements/walks are specified in Division 32 sections.

1.3 QUALITY ASSURANCE:

- A. Codes and Standards: Comply with most recent version (unless specifically noted otherwise) of all applicable provisions of state and local building and safety codes and all other codes referenced therein, other federal (OSHA) safety requirements, and other codes and standards referenced in this specification, except where more stringent requirements are indicated or specified herein.
 - 1. ACI 301-14 "Specifications for Structural Concrete for Buildings".
 - 2. ACI 318-14 "Building Code Requirements for Reinforced Concrete".
 - 3. ACI SP-15 "Field Reference Manual", provide copy in field office.
 - 4. ACI SP-66 "Detailing Manual for Reinforced Concrete".
 - 5. ACI 117 "Standard Specifications for Tolerances for Concrete Construction and Materials".
 - 6. ACI 302 "Guide for Concrete Floor and Slab Construction".
 - 7. ACI 304 "Measuring, Mixing, Transporting, and Placing Concrete".
 - 8. ACI 305 "Hot Weather Concreting".
 - 9. ACI 306 "Cold Weather Concreting".
 - 10. ACI 308 "Standard Practice for Curing Concrete".
 - 11. ACI 309 "Recommended Practice for Consolidating Concrete".
 - 12. ACI 311 "Recommended Practice for Building Concrete Inspection".
 - 13. ACI 347 "Recommended Practice for Concrete Formwork".
 - 14. CRSI "Manual of Standard Practice", latest edition.
- B. Inspection and Testing: Owner will employ, at his expense, an Independent Testing Laboratory (ITL) to perform quality assurance program. ITL shall comply with ASTM 1077. Field technicians shall be certified as an ACI Grade I Field Testing Technician. Laboratory technicians conducting strength testing shall be certified as an ACI Strength Testing Technician. The quality assurance program shall include, but shall not be limited to the following testing/reports:

1. Verify that concrete operations are performed and concrete is placed and consolidated according to referenced standards.
2. Verify that contractor is using approved compounds for curing, sealing, grouting, and patching operations. Check that proper curing techniques are performed according to hot and cold weather placement requirements of ACI.
3. Sample Fresh Concrete: ASTM C-172, except modified for slump to comply with ASTM C-94 as indicated below. All tests shall be associated by reference to particular batch ticket. Sampling is to be performed only after all water or other admixtures have been added and fully integrated into the mix.
 - a. Slump - ASTM C-143; one (1) test for each concrete load at point of placement discharge from transportation vehicle; one (1) test for each set of compressive strength test specimens.
 - 1) All concrete trucks are to arrive at the site with **full** water tanks. The ITL shall verify that each truck's water tank is full. **Any** amount of water short of the full tank capacity shall be recorded as having added to the concrete load.
 - b. Air Content - ASTM C-173; volumetric method for lightweight or normal weight concrete; ASTM C-231 pressure method for normal weight concrete; one (1) for each set of compressive strength test specimens.
 - 1) This test is not required for concrete not requiring air-entrainment under this specification.
 - c. Concrete Temperature - For each load, at time of arrival and at point of discharge from transportation vehicle, test hourly when air temperature is 40 degree F and above; test each time a set of compression test specimens are made.
 - d. Unit Weight - Determine unit weight for each strength test in accordance with ASTM C-138 for normal weight concrete and ASTM C-567 for lightweight concrete (if any).
 - e. Compression Test Specimens - ASTM C-31; one (1) set of four (4) standard cylinders for each 100 c.y. or fraction thereof, of each concrete class placed in any one (1) day or for each 10,000 s.f. of surface area placed in any one (1) day , whichever is lesser unless otherwise directed. Contractor may, at his expense, elect to have additional test cylinders prepared as part of each set of test specimens. Such cylinders may be used to establish concrete strengths to validate proceeding with other phases of the work prior to testing of Owner's required specimens.
 - 1) Cylinder diameters must be 1.5 times the largest aggregate size or larger; and may not be smaller than 4" in diameter regardless of aggregate size.
 - 2) Both individual cylinders and compression test sets shall be identified in a coordinated and sequential manner and shall be uniquely and explicitly associated with their particular batch ticket and placement location. Compression tests and reports shall clearly and explicitly identify both the compression test set and the individual cylinders tested.
 - 3) Specimens shall be taken at point of placement discharge. Mold/store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
 - 4) After the required set of cylinders has been taken if the concrete load is re-dosed with superplasticizer then an additional set of cylinders shall be taken as required herein. This extra set shall not count against the regular number of required test cylinders and shall be paid for by the Contractor.
 - 5) When required sets of specimens will provide less than five (5) strength tests for a given class of concrete, prepare sets from at least five (5) randomly selected batches or from each batch if fewer than five (5) batches are used.
 - 6) When total quantity of a given class of concrete is less than 50 c.y. strength testing may be waived by the Structural Engineer if, in his judgment, adequate evidence of satisfactory strength is provided.
 - 7) Where cold weather placing conditions occur, as defined in this specification, two (2) additional standard cylinders are required for each complete set of test

specimens. These two cylinders shall be field cured, at a location determined by the ITL.

- a) Where field cured specimens are required, Contractor shall be responsible for storage, temperature control, and protection of specimens while at site. ITL shall be responsible for handling and transportation of specimens. See below paragraphs.
- f. Cylinder Storage - Per ASTM specifications, after concrete cylinders are made, they are required to be stored in a temperature controlled environment. Contractor shall be responsible for providing a location for the ITL to securely place cylinders until they pick up by the ITL for delivery to the testing lab. Contractor shall be responsible for monitoring the cylinder storage site and maintaining the required temperatures.
 - 1) Per ASTM specifications, after concrete cylinders are made, the ITL has a 24 to 48 hour time to pick up the site stored cylinder for delivery to the testing lab. Contractor shall provide access for the ITL to retrieve cylinders in the specified time period. This shall include days on which the contractor may not be present or construction activities may not be occurring at the site.
- g. Compressive Strengths Tests - ASTM C-39; for each set of cylinders, test two (2) specimens at seven (7) days, two (2) specimens at twenty-eight (28) days. Retain any remaining specimen(s) in reserve for later testing if required. Testing of reserve cylinder(s), if required, shall be at the Contractor's expense.
 - 1) Where cold weather field cured specimens are required, transport and test one (1) specimen with companion laboratory cured specimen at seven (7) days and transport and test the remaining field cured specimen with companion laboratory cured specimens at twenty-eight (28) days.
- h. Strength Acceptability: Comply with ACI 318; strength level of concrete will be considered satisfactory if both:
 - 1) Continuous arithmetic averages of any three (3) consecutive strength test results equal or exceed specified compressive strength (i.e. a continuous consecutive moving average).
 - 2) No individual strength test result falls below specified compressive strength by more than
 - a) 500 psi when $f'c$ is 5,000 psi or less
 - b) $.1f'c$ when $f'c$ is more than 5,000 psi
 - 3) Where strength tests fail ACI-318 defined acceptability the concrete mix shall be modified. Refer to "Proportioning and Design of Concrete Mixes" in this specification section.
 - a) Compression strength tests utilizing curing times longer than 28 days are not identified in ASTM or ACI acceptability criteria and shall not be considered as indicative of concrete mix strength acceptability unless explicitly noted on the drawings for a particular strength ($f'c$) or mix type.
 - 4) When strength of field-cured cylinders is less than eighty-five per cent (85%) of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting/curing in-place concrete.
- i. Concrete Test Reports - Test results will be reported, in writing, to Structural Engineer and Contractor on same day tests are made. Test reports shall be numbered identically to test specimen sets. Show all cylinders of a given set on one report. Submit and re-submit same report to show tests of subsequent cylinders of same set.

- 1) The Contractor, Architect, and Structural Engineer shall be notified in writing on the same day of the tests for any:
 - a) 7 day compression strength tests failing to reach 75% of specified 28 day compressive strength.
 - b) 3 day compression strength tests failing to reach the agreed upon compressive strength target.
- 2) To avoid large volumes of paper and waste, reports may, and are encouraged for this project, to be submitted via email subject to approval of Architect/Structural Engineer.
- 3) Reports of compressive strength tests shall contain the following:
 - a) Name of testing service/agency
 - b) Project identification name and number
 - c) Test report (specimen set) number
 - d) Date of concrete placement
 - e) Copy of batch ticket for specimen set
 - f) Concrete type, class, and mix number
 - g) Air temperature, Concrete temperature, and Curing Duration temperature
 - h) Slump, Air Content, and Unit Weight
 - i) Location of concrete batch in structure
 - j) Design compressive strength in 28 days
 - k) Concrete mix proportions and materials
 - l) Listing/volumes of all items added to the mix (i.e. superplasticizer, retarder, water, etc.)
 - m) Compressive breaking strength of each cylinder of set
 - n) Type of break for both 7 day test and 28 day tests
 - o) Identification of lab and field cured cylinders
4. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
5. Additional Test for Concrete Work: ITL will make additional tests of in-place concrete work as directed by Architect or Structural Engineer when tests or other characteristics fail to conform to the acceptance criteria of this specification.
 - a. Where concrete strength or integrity are in question, the ITL shall conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C-42 or other appropriate methods. Three (3) cores are required for each concrete placement represented by a non-conforming strength test. Cores shall be considered to demonstrate acceptable concrete strength where both of the following are met:
 - 1) The average of the three cores exceeds 85% of the required f'c
 - 2) Each of the cores exceeds 75% of the required f'c
 - b. Costs of additional tests shall be borne by Owner if test results indicate conformance with Contractor Documents, except where the credibility or validity of the original cylinders was compromised due the ITL or the contractor not following ASTM requirements for handling, storing, transporting or testing the cylinders. In such cases the party violating ASTM requirements shall pay for the additional sampling and testing, regardless of the test results.
 - c. Contractor shall pay for testing indicating non-conformance with Contract Documents, including additional architectural or engineering services made necessary by such non-conformance.
 - d. Strength of structure in place will be considered to be potentially deficient if it fails to comply with any requirement that controls strength of structure.
 - 1) Cost of further additional tests, including load tests and/or other non-destructive tests performed by Owner's ITL as directed by Architect/Structural Engineer or tests conducted by Contractor to prove adequacy of concrete work, shall be borne

by Contractor including additional architectural/engineering services made necessary by such tests.

6. Measurement of Finished Floor Slab Surface Tolerances: ITL shall measure and evaluate the top surface of such floor slabs as identified by the Architect/Structural Engineer for compliance with the "F" numbers specified herein under "MONOLITHIC SLAB FINISHES". ITL shall have such equipment and trained personnel as required to facilitate such work. Measurement and reports shall be furnished in a timely manner to the Owner, Architect, Structural Engineer, and Contractor.
7. Other Reports: ITL shall provide written reports to architect and structural engineer recording any materials, tests, placements, or processes not in conformance with the Construction Documents; inform contractor immediately of all non-conformities; verify that contractor has made all necessary corrections.
 - a. Report to the structural engineer and architect in writing errors in placement of reinforcing or any other structural elements which are not corrected prior to placement of concrete. Report specifics (sizes, location, etc) of the item(s) not in conformance with contract documents or shop drawings.
 - b. Time required for the architect and engineer to evaluate construction errors, design construction modifications where required, and communicate elevation findings and construction modifications shall be reimbursed by the contractor.
8. Contractor's Tests: Inspections for testing ordered by and/or performed for Contractor's convenience shall be sole responsibility of Contractor.

1.4 SUBMITTALS:

- A. Product Data: Manufacturer's product data with application/installation instructions for proprietary materials/items, including admixtures, patching compounds, epoxies (adhesives), grouts, waterstops, joint systems, curing compounds, dry-shake finish materials, hardeners, sealers, and other items requested by Architect/Structural Engineer. Submit samples to the Architect/Structural Engineer, when requested, for all concrete products proposed for use.
- B. Material Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by Architect/Structural Engineer. Certificates shall be signed by manufacturer/Contractor certifying each material item complies with, or exceeds specified requirements. Material reports are required for all fly ash material used (if any)..
- C. Substitutions: Any request for product or material substitution must be submitted for review, with all necessary documentation, a minimum of ten (10) days prior to time of bid. No requests for substitutions will be considered after bids have been received.
- D. Concrete Mix Design: Submit written reports/laboratory tests of each proposed concrete mix for each class of concrete, **NOT LESS THAN FOURTEEN (14) days** prior to start of work. Either the "Field Experience Method" or "Laboratory Trial Batch Method" shall be used to proportion concrete mix designs in accordance with procedures in referenced ACI standards. The concrete mix designs shall conform to the requirements of this specification and both ACI 301 and ACI 318.
 1. Reports/Laboratory tests prepared more than **twenty four (24) months** prior to the date submitted for review are not acceptable.
- E. Changes and Deviations: After review, neither products nor construction requirements indicated on the drawings may be changed or deviated from. Changes following drawing review may be requested by the Contractor in writing and shall clearly delineate requested change. Contractor shall not proceed with any requested changes until notified by Architect/Structural Engineer, in writing, of acceptability.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS:

- A. Portland Cement: ASTM C-150, Type I, unless otherwise acceptable to Structural Engineer. Type III may be used when approved by Structural Engineer. Use one brand of cement throughout project, unless acceptable to Architect/Structural Engineer. The Total Equivalent Alkalies (all Sodium plus 2/3 of the Potassium in the cement) shall be less than 0.6%.
1. ASTM C-595, Type IP blended cement may be used in lieu of Portland cement and fly ash (as indicated below). However, pozzolanic content of blended cement shall be specified to meet the same minimum requirements as indicated for fly ash use.
- B. Fly Ash: ASTM C-618, Type C or F except that loss on ignition shall not exceed 4% and the fly ash shall meet the optional physical restrictions on uniformity as shown in Table 2A of ASTM C-618. Use of fly ash shall **NOT EXCEED 25% AND SHALL NOT BE LESS THAN 15%** of cementitious materials content by weight.
1. Contractor shall submit to the Architect/Structural Engineer a Materials Certification from the supplier showing compliance with the requirements herein. Use one source of fly ash throughout the project. Where fly ash substitution is used Contractor shall rigidly adhere to requirements for curing contained in this specification.
 2. Use of fly ash is **PROHIBITED** for use in parking structures or where concrete will be exposed for architectural effect. Use of fly ash is **PROHIBITED** in concrete that shall be placed or which may be placed in conditions requiring cold weather placing procedures as defined in this specification.
- C. Micro-silica (silicafume): **NO MICRO-SILICA IS PERMITTED ON THIS PROJECT.**
- D. Blast Furnace Slag: **NO BLAST FURNACE SLAG IS PERMITTED ON THIS PROJECT.**
- E. Normal Weight Aggregates: ASTM C-33, and as herein specified; provide aggregates from single source for exposed concrete. For exterior exposed surfaces do not use fine or coarse aggregates containing expansive or deleterious substances.
1. Local aggregates not complying with ASTM C-33 but which have shown by special test or actual service to produce concrete of adequate strength/durability may be used when acceptable to the Structural Engineer.
- F. Lightweight Aggregates: ASTM C-330 "Stalite" expanded shale aggregate produced by rotary kiln method acceptable to the Structural Engineer or approved equal.
- G. Aggregate Size: Aggregate sizes shall be as follows:
1. Formed concrete elements other than below.....#67 stone (3/4" max.)
 2. Elements formed by and placed against earth.....#57 stone (1" max.)
 3. Post-tensioned transfer girders#8 stone (3/8" max.)
 4. Concrete masonry fill.....#78M stone (1/2")
- H. Water: Potable and containing no more chloride ions than are normally found in available local municipal water supplies.
- I. Air Entraining Admixture: ASTM C-260, certified by manufacturer for compatibility with other required admixtures. "Air Mix" or "Perma-Air" by Euclid Chemical; "MB-VR" or "Micro-Air" by Master Builders; "Air-Tite" by Cormix Construction Chemicals; "Sika AER" or "Sika AEA-15" by Sika Corporation; "Darex AEA" or "Daravair" by W.R. Grace; "Sealtight AEA" by W.R. Meadows. No air-entraining admixtures shall be used in any concrete scheduled to receive surface hardener compounds.
- J. Water Reducing Admixture: ASTM C-494, Type A, and containing not more than 0.05% chloride ions. "Eucon WR-75" or "Eucon WR-89" by Euclid Chemical; "Pozzolith 200N" or "Polyheed" by Master Builders; "WRDA-Hycol" by W.R. Grace; "Plastocrete 161" or "Plastiment NS" by Sika Corporation; "PSI N" by Cormix Construction Chemicals.

- K. High Range Water Reducing Admixture (Superplasticizer): ASTM C-494, Type F or G (type "G" not permitted), and containing not more than 0.05% chloride ions. "Eucon 37" by Euclid Chemical; "Sikament 300" by Sika Corporation; "Daracem 100" or "WRDA-19" by W. R. Grace; "PSI Super" by Cormix Construction Chemicals; "Rheobuild 1000" by Master Builders.
- L. Non-Corrosive/Non-Chloride Accelerator Admixture: ASTM C-494, Type C or E, non-corrosive non-chloride and containing not more than 0.05% chloride ions. "Accelegard 80" by Euclid Chemical; "Pozzutec 20" by Master Builders; "Gilco Accelerator" by Cormix Construction Chemicals; "Plastocrete 161HE" or "Plastocrete 161FL" by Sika Corporation; "Daraset" by W.R. Grace. The admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least one year duration) using an acceptable accelerated corrosion testing method such as that using electrical potential measurements.
- M. Water Reducing/Retarding Admixture: ASTM C-494, Type D, and containing not more than 0.05% chloride ions. "Eucon Retarder 75" by Euclid Chemical; "Pozzolith 300-R" by Master Builders; "Plastiment" by Sika Corporation; "Daratard-17" by W. R. Grace.
- N. Prohibited Admixtures: Calcium chloride, thiocyanates, or any admixtures containing more than 0.05% chloride ions are not permitted. Written conformance to above-mentioned requirements and chloride ion content of admixture will be required from admixture manufacturer prior to mix design review by Structural Engineer.
- O. Certification: Written conformance to the preceding requirements and chloride ion content of the admixture will be required from the admixture manufacturer prior to concrete mix design review by the Structural Engineer.

2.2 CURING AND SEALING COMPOUNDS:

- A. General: Provide compound as follows:
 - 1. Liquid Membrane Forming Curing Compound for exposed interior concrete surfaces which will not receive finishes or materials requiring bond or adherence to underlying concrete and for all other concrete surfaces requiring curing or where indicated on the drawings.
 - 2. Dissipating Resin Curing Compound for all concrete surfaces which will receive finishes or materials requiring bonding or adherence to underlying concrete or where indicated on the drawings. Coordinate use of proper curing compound with other specification sections and with Architectural and other drawings.
- B. Liquid Membrane-Forming Curing Compound: ASTM C-309, Type 1, Class A, clear styrene acrylate type, 30% solids content minimum certified by manufacturer for compatibility with other required admixtures. Maximum moisture loss shall not exceed 0.055 grams/sq. cm. when applied at coverage rate of 300 s.f./gallon. Manufacturer's certification required. Subject to compliance provide "Super Rez Seal" or "Super Floor Coat" by Euclid Chemical; "Cure & Seal 31%" by Symons Corp.; "Dress & Seal 30" by L&M Construction Chemicals; "Masterseal 66" by Master Builders; "Hardtop" by Cormix Construction Chemicals; or approved equal.
- C. Low V.O.C. (Volatile Organic Compounds) Water Based Acrylic Membrane Curing Compound: ASTM C-309, Type 1, Class B shall be used wherever state or local requirements mandate control of V.O.C. emissions from curing compounds. Maximum moisture loss shall not exceed 0.055 grams/sq. cm. when applied at coverage rate indicated by manufacturer's instructions. "Highseal" by Conspect Marketing and Manufacturing Co.; "Safe Cure and Seal" by Dayton Superior Corp.; "Aqua-Cure" by Euclid Chemical; "Dress & Seal #18B" by L&M Construction Chemicals; "Cure & Seal 31%E" by Symons Corp.; "Masterseal W" by Master Builders; "Sika Membrane" by Sika Corporation; or approved equal.
- D. Dissipating Resin Curing Compound: Conform to ASTM C-309, Type 1 or 1-D, Class B certified by manufacturer for compatibility with other required admixtures. Film must chemically break down in eight to ten week period. Subject to compliance provide "Kurez DR" by Euclid Chemical; "Mastercure" by Master Builders; "Sealco 309" by Cormix Construction Chemicals;

"Kure-N-Seal" by Sonneborn-Rexnord; "Resi-Chem C309" by Symons; or approved equal.

1. Wherever state or local requirements mandate control of V.O.C. emissions from curing compounds provide "Resi-Chem Clear Cure" by Symons; or approved equal V.O.C. compliant dissipating resin curing compound.

2.3 EPOXY ADHESIVE ANCHOR SYSTEM:

- A. General: Provide high strength two-part injectable epoxy system for installation of adhesively bonded threaded rod and reinforcing bars. This is a specialty application that requires the use of the specific product(s) and manufacturer indicated. No substitutions are permissible.
- B. Epoxy Adhesive: Conform to ASTM C-881-90, Type IV, Grades 2 and 3, Class A, B, and C except gel times; bond strength per ASTM C-882-91 for 2-day cure 1800 psi and 7-day cure 1800 psi; compressive strength and modulus per ASTM D-695-96 of 12,000 psi and 2.2×10^5 psi respectively; tensile strength per ASTM D-638-97 for 7-day cure 6310 psi; elongation at fracture per ASTM D-638-97 of 2.0%; heat deflection temperature of 146°F; absorption per ASTM D-570-95 of 0.06; linear coefficient of shrinkage per ASTM D-2566-86 of 0.004. Product must comply with ICC-ES AC308 for seismic and wet holes, provide extended curing temperature range from 41°F to 104°F, and produce no offensive odors based on indoor controlled air conditions. Provide Hilti "HIT-RE 500-SD" or Simpson "SET-XP" system.
- C. Threaded Rod Anchors: Obtain threaded rod anchors from manufacturer, unless specifically permitted otherwise by Structural Engineer in writing. Standard and high strength material shall be zinc plated to ASTM B-633 SC1.
 1. Provide threaded rod complying with the following as required:
 - a. Standard rod material per ASTM A-36 $F_y=36$ ksi and $F_u=58$ ksi
 - b. High strength rod material per ASTM A-193 Grade B7 $F_y=105$ ksi and $F_u=125$ ksi
 - c. Stainless steel rod per ASTM F-593 (AISI 304) Condition CW 3/8" – 5/8" diameter
 - d. Stainless steel rod per ASTM F-593 (AISI 304) Condition CW 3/4" – 1 1/4" diameter
 2. Provide nuts and washers complying with the following as required:
 - a. Standard nut material per ASTM A-563 Grade A
 - b. High strength nut material per ASTM A563 Grade DH
 - c. Stainless steel nut material per ASTM F594
 - d. Standard and stainless washer material dimensional requirements per ANSI B18.22.1 Type A Plain
 - e. High strength washer material per ASTM F-436
- D. Reinforcing Bar: Comply with requirements of Section 032000 "Concrete Reinforcement".

2.4 RELATED MATERIALS:

- A. Bonding Compound: Polyvinyl acetate or acrylic base, re-wettable type for use in architectural and/or non-structural repairs only. Product shall be for interior or exterior use and shall not re-emulsify under exposed weather conditions.
 1. Polyvinyl Acetate (Interior use only): "Weldcrete" by Larson Products; "EucoWeld" by Euclid Chemical; "Everweld" by L&M Construction Chemicals Inc.
 2. Acrylic or Styrene Butadiene: "Daraweld C" by W.R. Grace; "SBR Latex" by Euclid Chemical; "Sikabond" by Sika Corporation; "Sonocrete" by Sonneborn-Contech; "Everbond" by L&M Construction Chemicals; "Acryl-Set" by Master Builders; "Intralok" W.R. Meadows Inc.
- B. Epoxy Adhesives: ASTM C-881 100% solids, 100% reactive, two (2) component material suitable for use on dry or damp surfaces for use in structural repairs. "Thiopoxy" by W.R. Grace; "Sikadur 32 Hi-Mod" by Sika Corporation; "Euco Epoxy 452 or 620" by Euclid Chemical; "Concresive 1001" by Master Builders; "Epobond" by L&M Construction Chemicals; or

approved equal.

- C. Patching/Leveling Mortar: Free flowing, polymer modified cementitious coating for use in localized floor slab patching repairs. "Euco Thin Coat" by Euclid Chemical, "Sikatop 111" by Sika Corporation, or "Sonopatch" by Sonneborn-Contech.
- D. Underlayment Compounds: Free flowing, self-leveling, pumpable, cementitious base compound. "Flo-Top" by Euclid Chemical, "Pourcrete" by Master Builders, "Thoro Underlayment Self-Leveling" by Thoro System Products, "K-15" by Ardex, Inc., "Levelex" by L&M Construction Materials, Inc.; "Sikatop 111" by Sika Corporation; or approved equal.
- E. Repair Topping Compounds: Self-leveling, polymer modified high strength topping for generalized repair topping of large areas. For use as a complete floor slab overlayment/topping. "Thin Top SL" by Euclid Chemical.
- F. Waterstops: Square or rectangular self expanding butyl rubber strip with sodium bentonite or other hydrophilic polymers. Provide at construction joints and other joints as shown on drawings and where noted on Architectural and/or structural drawings. Size waterstop to suit each joint condition. "Volclay Water Stop RX", CETCO Building Materials Group, or approved equals where shown on the drawings
 - 1. Flat, dumbbell type, or centerbulb type rubber or polyvinyl waterstops **ARE NOT PERMITTED.**
- G. Reglets: Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 26 gauge galvanized sheet steel or 28 gauge stainless steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris. Products by Heckman Building Products, Hohmann and Barnard, Inc., or approved equal.
- H. Cast Metal Stair Nosings (Exterior Stairs): Abrasive non-skid type for all exterior stairs; 4" wide by full length of tread less 2" each end, unless otherwise indicated on the drawings. Provide integral anchors on each nosing spaced 4" or less from each end and 15" or less o/c. for embedding in concrete. Products by American Abrasive Metals Co. (Aluminum), Safe-T-Metal Company, Inc. (Aluminum), Wooster Product, Inc. (Alumogrit), or approved equals.
- I. Moisture Barrier: Refer to Architectural drawings and specifications for all moisture retarder or barrier requirements.
- J. Absorptive Cover: Burlap cloth from jute or kenaf, approximately 9 oz/s.y., AASHTO M 182, Class 2.
- K. Moisture-Retaining Cover: One (1) of the following, complying with ASTM C-171 waterproof paper, polyethylene film, or polyethylene-coated burlap.
- L. Evaporation Retarder: Provide surface evaporation retarder for concrete slab construction in accordance with manufacturer's instructions. Subject to compliance provide "Euco-Bar" by The Euclid Chemical Co. or "Confilm" by Master Builders or approved equal.
- M. Slab on Grade Joint Filler: Epoxy joint filler shall be a 100% solids compound with a minimum Shore D hardness of 50. "Euco 700" by Euclid Chemical; "Sikadur 51SL" by Sika Corporation or approved equal.
- N. Non-Shrink Grout: Pre-mixed, non-corrosive, non-metallic, non-staining shall contain selected silica sands, Portland cement, shrinkage compensating, plasticizing, and water reducing agents. Product shall require only addition of water and comply with requirements of CRD-C621-83. Minimum compressive strength when tested according to ASTM C-109 per manufacturers maximum allowable water content - 2500 psi after one day; 7000 psi after twenty-eight (28) days. Grout shall be free of gas production or air releasing and oxidizing agents; and contain no corrosive iron, aluminum or gypsum; Setting times shall be in accordance with CRD-C 614-80 and initial setting time shall not be less than 45 minutes when

tested in accordance with ASTM C-191.

1. Factory pre-mixed grout shall conform to ASTM C-1107, "Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink)". Grout manufacturer shall also furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve a 95% bearing under a 48" x 48" base plate. Subject to compliance, one of the following:
 - a. "Euco NS" by Euclid Chemical Co.
 - b. "Masterflow 713" by Master Builders
 - c. "Five Star Grout" by U.S. Grout Corp.
 - d. "100 Non-Shrink Grout (Non-Metallic)" by Conspec, Inc.
 - e. "Supreme Grout" by Cormix, Inc.
 - f. "Sure Grip Grout" by Dayton Superior
 - g. "Sealtight 588" by W.R. Meadows
 - h. "Propak" by Protex Industries, Inc.
 - i. "Set Non-Shrink" by Set Products, Inc.
2. Where high fluidity and/or increased placing time is required use high flow grout. Factory pre-mixed grout shall conform to ASTM C-1107, "Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink)". Grout manufacturer shall also furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve a 95% bearing under a 18"x 36" base plate. Subject to compliance, one of the following or approved equal:
 - a. "Euco High Flow Grout" by Euclid Chemical Co.
 - b. "Masterflow 928" by Master Builders
3. All grouting shall be performed according to recommendations of ACI and grout manufacturer's printed specification for site preparation, product mixing and placing. Product shall be acceptable for use under steel base plates and bearing plates.

2.5 PROPORTIONING AND DESIGN OF CONCRETE MIXES:

- A. Contractor is responsible for preparation of design mixes for each class of concrete used in construction. Use an independent testing laboratory acceptable to Architect for design, preparation and reporting proposed mix designs. All mixes must have accompanying compression and shrinkage tests data in order to be reviewed for approval
- B. Materials and admixtures proposed in mix design shall be the same as those materials and admixtures that will be used in the production mix. Trial batches shall be prepared under temperature and humidity conditions anticipated to occur under the actual job conditions. Do not proceed with concrete production until the Structural Engineer has approved mixes.
- C. All mix designs shall be established in accordance with Section 5.3, Proportioning on Basis of Field Experience and/or Trial Mixtures" of ACI 318. Submit mix designs on each class, strength, and density of concrete for review.
 1. Trial Batching: Trial batching **is required** where test records do not meet the requirements of the "Standard Deviation" method of ACI 318 or where the materials employed in the test records are unclearly defined or inconsistently employed, or where equipment changes have occurred in the supplier's facility subsequent to the test records.
 - a. Trial batches shall achieve a compressive strength 1200 psi higher than specified strength. This over-design shall be increased to 1400 psi when concrete strengths over 5000 psi are used.
 - b. Trial batches shall be prepared by an independent testing laboratory complying with ASTM C-1077 and shall have been prepared and tested no more than twelve (12) months prior to the review submission date. Mix designs utilizing trial batch testing exceeding that time frame **are not acceptable and shall not be submitted** without the Structural Engineer's prior approval.

2. Standard Deviation: Where **ALL** of the following are met the strength criterion may be established using the "Standard Deviation" method of ACI 318:
 - a. For supplier's explicitly identified mix designs
 - b. For each independent plant and/or mixing unit of the supplier
 - c. Independently obtained consecutive test records must comply with the ACI 318
 - d. No individual test record employed exceeds **twenty four (24) months** in age
 - e. Materials employed were no more restrictive than permitted in this specification
 - f. **None** of the conditions noted under paragraph 1 "Trial Batching" above exist

- D. Concrete Strength: Concrete strengths shall be provided as indicated on the drawings and tested in accordance with ASTM C-39 and as specified herein.

- E. Mix Adjustments: Contractor may request mix adjustments when characteristics of materials, project conditions, weather, test results, or other circumstances warrant. Laboratory test reports for revised mix designs and strength results must be submitted to Structural Engineer and reviewed before use of revised concrete mixes in work.
 1. Where as-used in-production concrete fails strength tests for ACI-318 defined acceptability or other required criteria defined herein, Contractor shall submit **revised concrete mix design(s)** for the associated concrete mix or mixes, modified to decrease the future possibility of compression test failures.
 - a. Strength is specified on the drawings as f'c at 28 days unless explicitly noted on the drawings for a particular strength (f'c) or mix type. Longer curing times **are not permissible** for mix designs for obtaining the specified f'c.

- F. Admixtures: High range water-reducing admixture (superplasticizer) shall be used in all concrete for cast-in-place walls. Either water-reducing admixture or high range water-reducing admixture shall be used in all other concrete.
 1. All pumped concrete, architectural concrete, and concrete with water-cement ratio below 0.50 shall contain specified high range water reducing admixture (superplasticizer).
 2. Use air-entraining admixture in all exterior exposed concrete and in interior concrete as noted below, unless otherwise indicated. Air-entraining admixtures **SHALL NOT** be used in any concrete scheduled to receive surface hardener compounds, unless specifically permitted by manufacturer of surface hardener compound. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of 1-1/2% within following limits:
 - a. Concrete structures/slabs exposed to freezing/thawing or subjected to hydraulic pressure:

Maximum Aggregate	Moderate Exposure
1-1/2"	4.5%
1"	4.5%
3/4"	5.0%
1/2"	5.5%
 - b. Other concrete 2% to 4% air (not exposed to freezing/thawing or hydraulic pressure).

- G. Water-Cementitious Materials (W/CM) Ratio: All concrete permanently exposed to the weather or exposed to freeze/thaw conditions during construction shall have a maximum w/cm ratio of 0.50. All concrete subjected to deicers and/or required to be watertight shall have a maximum w/cm of 0.45.

- H. Maximum Water-Cementitious Materials Ratio: Water-cement ratios for concrete shall not exceed the following, regardless of mix design, admixtures, or placement requirements.

Specified F'c	Max. w/cm Ratio
3000 psi	0.60

4000 psi

0.50

Concrete Slump: All concrete containing high range water-reducing admixture (superplasticizer) shall arrive at the jobsite with a slump of 2" to 3" (3" to 4" for concrete receiving a "shake-on hardener or for lightweight concrete), be verified by ITL, then high range water reducing admixture is to be added to increase slump to desired level, not to exceed 8". Superplasticizer may be added at the batch plant in lieu of at site, however slump at the point and time of placement shall be within prescribed limits. All other concrete shall have maximum slump of 4" unless noted otherwise in related specification sections. Slump shall be verified at the site by the ITL at the point and time of placement.

1. Additional Water: Addition of water beyond requirement of approved design mix limit is **NOT PERMITTED**. Use specified water reducing retarding admixture (Type D) when required by placing or temperature conditions.
2. Site Adjustment: The contractor may adjust the slump of the concrete at the site by electing to "hold back" a specified amount of water from each load of concrete (i.e. one gallon per cubic yard). Such "hold back" of water must be pre-approved by the Structural Engineer. The amount of "hold back" shall be established on a per cubic yard basis specific to a given mix and **may not vary** between trucks or between days **for the duration of the project**.
 - a. When water is added at the site, at no time may the total water in the concrete be beyond the requirement of approved design mix.
 - b. All water added at the site including any "hold back" shall be recorded by the ITL.
 - c. Contractor shall designate at the "Pre-Concrete Conference" meeting, the specific individual(s) who have the authority to add water to a given load of concrete. Authority shall be granted only to the designated individuals and cannot be delegated to others.
3. Arrival Rejection: All concrete trucks shall arrive at the site with full water tanks. The ITL shall check each trucks water tanks before slumping the mix. Any volume of tank water short of full will be assumed to already have been added to the concrete in the truck.
 - a. If the amount of water that the truck's tank is short of exceeds any approved "hold back" amount for that load of concrete, then the load is to be rejected and dismissed from the site at no cost to the owner.
 - b. If a load of concrete is not to have any water held back, and the truck arrives at the site without full water tanks, that load shall be **rejected and dismissed** from the site at no cost to the owner.
 - c. If any of the preceding requirements are violated and any load of concrete with the excess water is placed, **one (1) complete additional set of concrete test cylinders** shall be made for **each load** with excess water. This extra set shall not count against the number of required test cylinders included in the project cost.
 - 1) These cylinders including laboratory testing and any time expended by the Architect/Structural Engineer in the evaluation of the concrete and/or its effect on the structure shall be paid for by the Contractor.
 - 2) The ITL will as soon as it is practical notify and inform the project's superintendent, the Architect and the Structural Engineer via phone.
4. Superplasticizer Re-Dosing: Re-dosage with specified high range water reducing admixture may be permitted with prior approval of Structural Engineer as to methods/procedures. No more than **one (1) re-dosage** is permitted. Use water-reducing retarding admixture (Type D) when required by high temperatures, low humidity, or other adverse placing conditions.
 - a. Where concrete has been re-dosed with superplasticizer, one (1) **complete additional set of concrete test cylinders** is required for each load that is re-dosed. This extra set shall not count against the regular number of required test cylinders and shall be paid for by the Contractor.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Earth Formed Elements: Footings and slab turndowns may be formed by excavation provided earth will stand upright after vertical cuts and subject to inspection/approval by ITL.

Cut/excavate to provide required three (3) inch clear cover along sides and bottom for reinforcing placed in concrete poured against earth. De-water, clean, and level bottoms of excavations receiving concrete. Contractor shall provide additional concrete required beyond the as detailed minimum design profiles and dimensions of the footings or slab turndowns. Earth forms shall be wetted, but not made muddy, before the concrete is placed.

3.2 REINFORCEMENT:

- A. General: Comply with requirements for placing reinforcement in accordance with specifications in Section 032000.
- B. Clean Reinforcement: Remove loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete before proceeding with concrete placing operations. **DO NOT** place concrete onto reinforcing upon which water will freeze.

3.3 INSTALLATION OF EMBEDDED ITEMS:

- A. Inserts and Fastening Devices: Refer to drawings and other Specification Sections for extent, location, and details of materials to be embedded or placed in concrete. Sufficient time between erection of forms and placing of concrete shall be given to the various trades to permit the proper installation of their work. All devices installed in the forms shall be maintained in position and protected until the concrete pouring is completed.
 - 1. The installation of inserts, miscellaneous pipe sleeves, hangers, ties, angle supports, anchors, bolts, angle guards, dowels, thimbles, anchor slots, reglets blocking, nailers, and other materials for attachment of their work to concrete shall be under this Section under the supervision and at the location furnished by the trades requiring these devices. Do not install sleeves in any concrete beam, slab, joist, or column without both Architect's and Structural Engineer's review.
- B. Tolerances: Set/build into work anchorage devices and other embedded items required for other work attached to, or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions/directions provided by suppliers of items to be attached thereto. Tolerance for anchor bolts and other embedded items as follows:
 - 1. $\pm 1/8$ " center to center of any two (2) bolts within anchor bolt group, where anchor bolt group is defined as "set" of anchor bolts that receive single fabricated steel shipping piece.
 - 2. $\pm 1/4$ " center to center of adjacent anchor bolt groups.
 - 3. $\pm 1/2$ " top of anchor bolt elevation.
 - 4. Maximum accumulation of $1/4$ " per 100' along established column line of multiple anchor bolt groups, but not exceed total of 1" where established column line is actual field line representative of centers of as-built anchor bolt along line of columns.
 - 5. $\pm 1/4$ " from center of any bolt group to established column line through that group.
 - 6. Tolerances specified in b, c, and d above apply to offset dimensions shown on plans, measured parallel and perpendicular to nearest established column line for individual columns shown on plans to be offset from established column lines.
 - 7. Unless shown otherwise, centerline axes of anchor bolts are set perpendicular to theoretical bearing surface.
- C. Reglets: Install to receive top edge of foundation sheet waterproofing where occurs and to receive through-wall flashing in outer face of concrete frame at exterior walls where flashing is indicated on the drawings at lintels, relieving angles, and other conditions.

3.4 CONCRETE MIXES:

- A. Ready-Mix Concrete: Comply with approved concrete mix design, requirements of ASTM C-94, and as herein specified. Delete references for allowing additional water to be added to batch for material with insufficient slump. Addition of water to the batch will not be permitted. Provide batch ticket, as noted below, for each batch discharged and used in work.
- B. Job-Site Mixing: **NOT PERMITTED.**

- C. Mixing/Delivery Time: When air temperature is between 85 degree F and 90 degree F, reduce mixing/delivery time from 1-1/2 hours to seventy-five (75) minutes; when air temperature is above 90 degree F, reduce mixing/delivery time to sixty (60) minutes. During other conditions contributing to rapid setting of concrete, shorter mixing time than specified in ASTM C-94 may be required.
1. When air temperature has fallen to or is expected to fall below 40 degree F, uniformly heat all water and aggregates before mixing to obtain concrete mixture temperature of not less than 50 degree F and not more than 80 degree F, at any time during mixing, transporting or at point of placement.
 2. Do not use frozen material or material containing ice or snow.
 3. Do not place concrete on frozen sub-grade or on sub-grade containing frozen materials.
 4. Only specified non-corrosive non-chloride accelerator shall be used. Calcium chloride, thiocyanates, or admixtures containing more than 0.05% chloride ions are not permitted.
 5. Do not use materials containing antifreeze agents or chemical accelerators unless accepted in mix designs by the Architect/Engineer.
- D. Concrete Batch Tickets: Collected and retained by Contractor, with copies provided to ITL. Concrete batch tickets shall contain all information specified in ASTM C-94, paragraph "Batch Ticket Information", and including project identification name and number and time at point of batch discharge.
1. Ticket shall also clearly show amount of water for entire batch that may be added in field that will not exceed water/cement ratio specified by design mix and the amount of water actually added in the field, if any.
 2. Structural Engineer/Contractor shall be notified of trip tickets not as specified herein. Structural Engineer/Contractor will be immediately notified when amount of water in batch of concrete exceeds that allowed in design mix.
 3. Trucks arriving without trip tickets or with trip tickets missing any of the ASTM C-94 information shall be rejected.

3.5 CONCRETE PLACEMENT:

- A. Pre-placement Inspection: Before beginning placing concrete in any portion of a given pour, inspect/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. All of these noted components of a pour shall be inspected and any errors corrected BEFORE the beginning of a given pour.
1. Moisten wood forms immediately before placing concrete where form coatings are not used.
 2. Coordinate installation of joint materials and moisture barriers with placement of forms and reinforcing steel.
 3. Provide temporary protective covering to lower two (2) feet of finished walls adjacent to slab pours and in similar conditions, and protect against spattering finished elements during placement.
- B. General: Placement shall comply with ACI 301 "Specifications for Structural Concrete for Buildings" and with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete", and as herein specified.
1. Deposit concrete continuously or in layers. No concrete shall be placed on concrete that has hardened sufficiently to cause formation of seams or planes of weakness. Provide construction joints as shown on the drawings and/or as herein specified where concrete cannot be placed continuously. Deposit concrete as near as practicable to its final location to avoid segregation.
- C. Consolidating Placed Concrete: Use mechanical vibrating equipment supplemented by hand

spading, rodding, or tamping. Use equipment and procedures for consolidation in accordance with ACI 309 "Standard Practice for Consolidation of Concrete".

1. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than is visibly effective for the vibrator. Place vibrators to rapidly penetrate placed layer leaving at least 6" in preceding layer. Do not insert vibrators into preceding layers of concrete that have begun to set. Limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of concrete mix.
 2. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 3. Maintain reinforcing in proper position during all placing operations.
 4. When placing concrete that requires mechanical vibration, Contractor shall have adequate numbers of vibrators with adequate lengths to properly vibrate the most distant areas each pour. Contractor shall have at least one (1) fully functional backup vibrator at the site with length equivalent to the longest vibrator required for a pour.
- D. Concrete Footings: Footings and other foundations shall be placed only on certified compacted fill or approved undisturbed sub-grade as noted on the drawings. Footings shall not be loaded until concrete has reached a minimum of 75% of specified strength. Contractor shall review 7-day concrete cylinder tests to evaluate footing strength. Construction joints are not permitted in individual column footings.
- E. 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. Cold weather conditions are defined as a mean daily temperature of less than 40 degrees F for three (3) successive days. When temperatures of more than 50 degrees F occur during more than half of any 24-hour period, conditions are no longer regarded as requiring cold weather placing.
1. Where placement will occur under cold weather conditions, two (2) additional test cylinders are required per test cylinder set. Refer to "Testing and Inspection" previously in this specification Section.
- F. Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degree F. Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing.
1. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete. Fog spray forms, reinforcing steel, and sub-grade immediately before placing concrete.

3.6 CONCRETE CURING AND PROTECTION:

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Keep continuously moist for not less than seven (7) days. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least seven (7) days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.
- B. Curing Methods: Perform curing of concrete by moist curing, by moisture-retaining cover curing, by liquid membrane curing, and by combinations thereof.
1. Moisture cure by one or more of the following methods:
 - a. Keeping concrete surface continuously wet by covering with water.

- b. Continuous water-fog spray.
 - c. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.
2. Moisture cover cure by covering 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.
3. Cure exposed interior slabs with specified clear liquid membrane type curing/sealing compound. Cure other troweled or floated interior slabs with specified dissipating resin type curing compound. Apply as soon as final finishing operations are complete (within two (2) hours of completing finishing).
 - a. Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Re-coat areas subjected to heavy rainfall within three (3) hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - b. Do not use liquid membrane type curing compounds on surfaces to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, damp-proofing, membrane roofing, flooring, painting, and other coatings and finish materials, unless a letter certifying compatibility from manufacturer of subsequent finishing material/application is received and approved by Architect. Use dissipating resin curing compounds or above methods in these locations.
- C. Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, supported slabs 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.
- D. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing compound. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.

3.7 MISCELLANEOUS CONCRETE ITEMS:

- A. Filling-In: Fill-in holes/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/cure concrete as herein specified, to blend with in place construction. Provide other miscellaneous concrete shown or required to complete work.
- B. Slab On Grade: Do not fill in concrete slab on grade around base plates or otherwise cover base or bearing plates until after Architect/Engineer has observed installation and grouting.
- C. Slab on Grade Joints: Unless indicated otherwise on the architectural drawings or in Division 07 of these specifications, fill all slab on grade construction and control joints with specified epoxy joint filler compound. Slabs shall cure a minimum of sixty (60) days prior to applying filler compound.
- D. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections and terminations slightly rounded.
- E. Equipment Bases and Foundations: Provide machine/equipment bases and foundations as shown on drawings. Set anchor bolts for machines/equipment to template correct elevations complying with certified diagrams or templates of manufacturer furnishing machines/equipment. Grout base plates and foundations using specified non-shrink grout.
- F. Base/Bearing Plates: Grout base/bearing plates and foundations as indicated on the drawings using specified non-shrink non-metallic grout. Use high flow grout where high fluidity and/or

increased placing time is required.

- G. Steel Pan Stairs: Provide concrete fill for steel pan stair treads/landings and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp, and finish concrete surfaces as scheduled.

3.8 EPOXY ADHESIVE ANCHOR INSTALLATION:

- A. General: Comply with manufacturer's instructions for drilling/coring, cleaning, epoxy adhesive mixing and injection/placement, insertion of threaded rod and/or reinforcing bars, and curing time prior to placing any load on installed anchor(s).
- B. Drilling: Drill holes with manufacturer's approved drill bits to maximum of depth(s) indicated in manufacturer's instructions or as indicated on the drawings. Use bit diameter(s) approved by manufacturer for each given threaded rod or rebar diameter. Oversize holes may result in reduced anchor capacities. Do not drill oversize holes.
- C. Cleaning: Clean holes of all dust and drilling debris thoroughly to provide for proper bond of adhesive to concrete substrate. Wire-brush all holes full depth. For hole depths 8" and less and expel with compressed air or pressurized water **AND** for vertically downward drilled hole depths over 8" expel with compressed air **AND** vacuum to bottom of hole with high suction needle tube. Where pressurized water is used, epoxy adhesive shall not be injected/placed until all pooled water or water surface film has been removed from the concrete substrate. Substrate may be damp but shall not be moist at time of epoxy application.
1. Cleaning of drill/core dust from holes is **critical to proper performance** of epoxy adhesive. Improper or incomplete cleaning may result in premature failure of adhesive bond to concrete substrate.
- D. Monitoring: Where indicated on the documents as "Life Safety Critical" or similar notation, or as requiring monitoring, contractor shall have holes drilled and epoxy adhesive injected/placed only in the presence of representatives from both the adhesive supplier and the ITL. ITL shall file reports indicating work conducted (drilling depth, cleaning, epoxy injection, and rod/rebar insertion depth) at each drilling location.
- E. Load Testing: Load testing may be required for installation(s) where questionable conditions arise due to failure to comply with edge clearances, rod/rebar spacing, condition of concrete substrate, drilling/embedment depths, proper adhesive material/mixing, or verifiable rod/rebar strength.

3.9 CONCRETE SURFACE REPAIRS:

- A. Patching Defective Areas: Repair/patch defective areas with cement mortar immediately after removal of forms when acceptable to Architect/Structural Engineer. Cut out honeycomb, rock pockets, voids over 1/4" in any dimension, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.
1. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match the color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- B. Repair of Formed Surfaces: Remove/replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets; fins and other projections on surface; and stains and other dis-colorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.

1. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and/or replace concrete.
- C. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface/finish. Correct low/high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having required slope.
1. Repair finished unformed surfaces that contain defects that affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01" wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.
 - a. Contractor shall include in his bid repair of 100 linear feet of cracks and shall specify in his bid a fixed mobilization cost for equipment associated with repairing the cracks.
 - b. Additionally, provide a unit price for repair of cracks in excess of the linear footage specified.
 - c. Contractor shall credit the Owner at the specified unit price should the linear footage specified in the bid be less than the actual linear footage repaired.
 - d. If no crack repair is required or no equipment is mobilized for crack repair, then the Contractor shall also credit the Owner with the mobilization cost specified in the bid.
 2. Correct high areas in unformed surfaces by grinding, after concrete has cured at least fourteen (14) days. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Architect.
 3. Repair defective areas, except random cracks and single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and exposed reinforcing steel with at least 3/4" clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compounds. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish blending with adjacent finished concrete. Cure in same manner as adjacent concrete.
 4. Repair isolated random cracks and holes not over 1" in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing #16 mesh sieve, using only enough water as required for handling and placing. Place dry pack after bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched areas continuously moist for not less than seventy-two (72) hours.
- D. Structural Repairs: Where the existence of cracks reduces the structural performance of the structure to below design acceptability in the opinion of the Architect/Structural Engineer, the cracks must be structurally repaired. Cracks so defined shall have adhesive injection repair as appropriate to the particular condition(s). All structural repairs shall be made only with prior approval of the Structural Engineer as to method, procedure, and scope. Use specified and/or approved epoxy adhesive, epoxy mortar, methyl methacrylate, or other approved adhesive.
1. Where epoxy injection procedures must be used, an approved low viscosity epoxy produced by manufacturers acceptable to the Architect/Structural Engineer shall be used.
 2. Installation shall be by an installer licensed by the pre-approved epoxy supplier.
 3. Contractor shall include in his bid for each 10,000 sq. ft. of slab the following lineal footage of adhesive injection crack repair for:
 - a. Non-vehicle supporting slabs within the building envelope 100 feet
 - b. Non-vehicle supporting slabs outside the building envelope..... 100 feet
 4. Additionally, the contractor shall include 100 feet of routed and caulked crack repair for

- each 10,000 square feet of slab at the top level of vehicle supporting facilities.
5. The contractor shall include in his bid a fixed mobilization cost for personnel and equipment associated with the repairs noted herein.
 - a. An Add & Deduct unit price for repair of cracks (both adhesive and caulked) as specified shall be included in the bid.
 - b. The Contractor shall credit the Owner at the specified unit price should the linear footage specified in the bid be less than the actual linear footage repaired.
 - c. If no crack repair is required or no equipment is mobilized for crack repair, then the Contractor shall also credit the Owner with the mobilization cost specified in the bid.
 6. All concrete framed structures, when constructed as specified, will have some amount of slab cracks. The crack repair quantities noted herein are the minimum quantities that the Contractor shall budget for this project. Should the constructed facility have structural cracks in excess of the minimum allowances noted above, such additional repairs shall be performed at the contractor's expense, unless cracks are due to flexural design inadequacies.
- E. Where slab surface will not be exposed, leveling of floors for subsequent finishes shall be by use of specified underlayment material.
- F. Where slab surface will be exposed, leveling of floor shall be by use of specified self-leveling repair topping.
- G. Where required, routed and caulked slab repairs shall be done with routed joint of ¼" minimum to ½" maximum with depth equal to width. Caulking to be Tremco THC-900 or pre-approved equal.
- H. Repair methods not specified above may be used, subject to acceptance of Architect/Structural Engineer.

END OF SECTION 03 30 00

SECTION 04 29 00

REINFORCED MASONRY WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division 00 and 01 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

- A. Reinforced masonry work includes all labor, materials, and equipment necessary and required for reinforced brick masonry, reinforced concrete masonry, and reinforced utility brick hollow bonded walls. This section applies only to reinforced masonry work.
- B. Extent of work to be performed and/or coordinated shown on the drawings and indicated in the specifications including, but not limited to masonry units, reinforcing, accessories, and grout.
- C. Related work specified elsewhere includes but is not limited to, Section 032000 Concrete Reinforcing, and Section 033000 Cast-In-Place Concrete.
- D. All mortar joints are to be struck with a concave strike.

1.3 QUALITY ASSURANCE:

- A. Codes and Standards: Comply with most recent version (unless specifically noted otherwise) of all applicable provisions of state and local building and safety codes and all other codes referenced therein, other federal (OSHA) safety requirements, and other codes and standards referenced in this specification, except where more stringent requirements are indicated or specified herein.
 - 1. ACI 530-08 "Building Code Requirements for Masonry Structures".
 - 2. ACI 530.1-08 "Specifications for Masonry Structures".
 - 3. ACI 301-08 "Specifications for Structural Concrete for Buildings" (for grout mixes).
 - 4. ACI 315-08 "Details and Detailing of Concrete Reinforcement".
 - 5. ACI 117 "Standard Specifications for Tolerances for Concrete Construction and Materials".
 - 6. ACI 305 "Hot Weather Concreting".
 - 7. ACI 306 "Cold Weather Concreting".
 - 8. CRSI "Manual of Standard Practice", latest edition.
 - 9. CRSI "Placing Reinforcing Bars", latest edition.
 - 10. AWS D1.4 "Structural Welding Code - Reinforcing Steel".
- B. Inspection and Testing: Owner will employ, at his expense, an Independent Testing Laboratory (ITL) to perform quality assurance program which will include, but shall not be limited to the following testing/reports:
 - 1. Refer to Section 032000 Concrete Reinforcement paragraph 1.3-B for inspection and testing requirements for reinforcing materials, accessories, installation, and reporting.
 - 2. Verify consistency of masonry mortar confirms to ASTM C-270 evaluated in accordance with ASTM C-780.
 - 3. Verify grout mixes conform to ASTM C-476 and strength conforms to value(s) indicated on the documents in accordance with ASTM C-1019 and requirements defined herein.
 - 4. Verify that grouting operations are performed and grout is placed and consolidated in accordance with the specifications.
 - 5. Verify that contractor is using approved admixtures for grout.
 - 6. Sample Fresh Grout: Obtain fresh grout samples for fine and coarse grout in accordance with ASTM C-1019. All samples and tests shall be associated by reference to particular

batch ticket or other methodology that provides for uniquely and explicitly identifiable samples and placement locations.

- a. Samples – Sampling is to be performed only after all water or other admixtures have been added and fully integrated into the mix. Sampling **shall not** be conducted using the first and last 10% of the batch volume. Samples shall be obtained as grout is being placed into the element being grouted. Three (3) “specimens” molded in accordance with ASTM C-1019 shall constitute one (1) “sample”. Two (2) samples shall constitute one (1) compressive strength test “set”.
- b. Specimens – Specimens shall be molded using the masonry units which will be in contact with the grout and with the materials, and procedures identified in ASTM C-1019 – alternative techniques and/or containers are **NOT PERMITTED**.
- c. Slump – ASTM C-143; one (1) test for each batch at point of placement discharge; one (1) test for each compressive strength test set. Minimum sample shall be at least ½ ft³ by volume.
- d. Air Content – ASTM C-173 volumetric method or ASTM C-231 pressure method for normal weight concrete; one (1) for each compressive strength test set. **This test applies to coarse aggregate grouts only.**
- e. Grout Temperature – For each batch, at time and point of discharge; monitor and test hourly when air temperature is 40 degree F and above; one (1) for each compressive strength test set.
- f. Compression Test Sets – ASTM C-1019; one (1) test set for each truck or mixer load of grout but not less than one (1) test set for each 5,000 sq. ft. of wall surface and in no case less than one (1) test set each - morning and afternoon - during grouting operations; preferably take samples when load is 50% discharged from truck/mixer, unless otherwise directed:
 - 1) Mold/store samples for laboratory cured testing except when field-cure test samples are required.
 - 2) After the required samples have been taken if the grout load is re-dosed with superplasticizer then an additional sample shall be taken. This extra sample shall not count against the regular number of required test samples and shall be paid for by the Contractor.
 - 3) Contractor may, at his expense, elect to have additional test samples prepared as part of each compressive strength test set. Such samples may be used to establish grout strengths to validate proceeding with other phases of the work prior to testing of Owner's required specimens.
 - 4) Where cold weather placing conditions occur, as defined in this specification, one (1) complete additional test set is required in accordance with the frequency identified above. This test set shall be field cured, at a location determined by the ITL.
 - 5) Where field cured test sets are required, Contractor shall be responsible for storage, temperature control, and protection of specimens while at site. ITL shall be responsible for handling and transportation of specimens.
- g. Compressive Strengths Tests - ASTM C-1019; for each test set, test one (1) sample at seven (7) days and one (1) sample at twenty-eight (28) days. Testing of any reserve or extra samples or sets shall be at the Contractor's expense.
 - 1) Where cold weather field cured specimens are required, transport and test one (1) sample with companion laboratory cured sample at seven (7) days and transport and test the remaining field cured sample with companion laboratory cured sample at twenty-eight (28) days.
- h. Strength Acceptability: Strength grout will be considered satisfactory if the 28-day sample strength equals or exceeds specified compressive strength and no individual specimen test result within that sample falls below specified compressive strength by more than 500 psi. Sample strength shall be the average of the three (3) specimens comprising a sample. Sample strengths, in exceptional cases, may be permitted using two (2) of the three (3) specimens solely at the discretion of the Structural Engineer (i.e.

the case of a damaged single specimen where the body of prior testing evidence would tend to broadly indicate consistent quality and acceptable strength).

- 1) When strength of field-cured sample is less than eighty-five per cent (85%) of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting/curing in-place grout.
- i. Grout Test Reports - Test results shall be reported, in writing, to Structural Engineer/Contractor on same day tests are made. Test report numbering shall be rationally coordinated to test sets, samples, and specimens. Show all samples and specimens of a given set on one report. Submit and re-submit same report to show tests of subsequent cylinders of same set. **Reports may, and are encouraged for this project, to be submitted via email subject to approval of Architect/Structural Engineer.** Reports of compressive strength tests shall at a minimum contain the following:
 - 1) Name of testing service/agency
 - 2) Project identification name and number
 - 3) Test report number
 - 4) Date of grout placement
 - 5) Copy of batch ticket for test set
 - 6) Grout type (Fine or Coarse)
 - 7) Location of grout batch in structure
 - 8) Design compressive strength in 28 days
 - 9) Grout mix proportions and materials
 - 10) Type and number of units used to form and mold specimens
 - 11) Description of specimens – dimensions and percentage amount of out of plumb
 - 12) Curing history, including maximum and minimum temperatures, and age of specimen when transported to laboratory and tested
 - 13) Slump and temperature(s)
 - 14) Air content – for coarse grout only
 - 15) Maximum load and compressive breaking strength of each specimen and average across the given sample
 - 16) Description of failure – type of break for both 7 day test and 28 day tests
 - 17) Identification of lab and field cured cylinders
7. Additional Tests: ITL will make additional tests of in-place grouted masonry work as directed by Architect or Structural Engineer when tests indicate specified grout strengths and other characteristics have not been attained in structure. Laboratory shall conduct tests to determine adequacy of masonry and grout by masonry prisms or, where possible, by cored cylinders complying with ASTM C-42 or other appropriate methods.
 - a. Costs of additional tests shall be borne by Owner if test results indicate conformance with Contractor Documents.
 - b. Contractor shall pay for testing indicating non-conformance with Contract Documents, including additional architectural or engineering services made necessary by such non-conformance.
 - c. Strength of structure in place will be considered to be potentially deficient if it fails to comply with any requirement that controls strength of structure.
 - 1) Cost of further additional tests, including load tests and/or other non-destructive tests performed by Owner's ITL as directed by Architect/Structural Engineer or tests conducted by Contractor to prove adequacy of masonry or grout work, shall be borne by Contractor including additional architectural/engineering services made necessary by such tests.
8. Other Reports: ITL shall provide written reports to architect and structural engineer recording any materials, tests, placements, or processes not in conformance with the Construction Documents; inform contractor immediately of all non-conformities; verify that contractor has made all necessary corrections.

9. Contractor's Tests: Inspections for testing ordered by and/or performed for Contractor's convenience shall be sole responsibility of Contractor.
- C. Construction Tolerances: Variations in reinforced masonry work from plumb and level, locations of built-in or embedded items, and other required tolerances shall be as required in related specification sections or as identified on the drawings.
- D. Protection of Work: Do not apply uniform loading for at least 12 hours after building masonry walls or columns. Do not apply concentrated loads for at least 3 days after building masonry walls, lintels, beams, columns, pilasters, and piers.
- E. Responsibility for Errors: Contractor shall bear all costs associated with corrective work resulting from errors or poor workmanship, including costs of architectural and engineering services associated with required correction.

1.4 SUBMITTALS:

- A. General: Contractor shall establish and provide a mutually agreed upon "Submittal Schedule" prior to beginning transmission of submittals for review. There is no requirement for the Architect or Structural Engineer to process or review any submittals prior to this Schedule being established and distributed to all relevant parties involved in Submittal preparation, processing, and review.
 1. Schedule shall identify and indicate individual packages, submittal dates, and required return dates. Dates shall be the date that the submittal is scheduled to arrive in the Structural Engineer's office for review to begin and the date that the returned submittal is required to arrive in the Contractor's office for distribution to his sub-contractors and fabricators.
 2. Scheduled review and return of submittals/shop drawings shall be based on a **MINIMUM of FOURTEEN (14) WORKING DAYS** in the Structural Engineer's office from receipt of submission to return to the next party for their action.
 3. Shop drawings should be submitted incrementally as appropriate packages are prepared to equalize the workload for review of the drawings and expedite the return schedule. Submission of a large volume of shop drawings at one time may result in review times that will be required to exceed those noted above. Definition of a "large volume" of shop drawings is subject to mutual interpretation.
 4. Contractor shall provide in his Schedule for the above noted time and for appropriate additional time for delivery (shipping) of drawings. No claims may be made on the part of the Contractor for delay of the project due to shop drawing reviews that occur within the above stated time limits or for reviews that take greater time than noted above due to submission of a large volume of shop drawings at one time.
- B. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials/items, and others as requested by Architect/Structural Engineer. Submit data for masonry sizes, shapes, weights, densities, strengths, material composition, admixtures, colors, and manufacturing processes and procedures. Submit samples to the Structural Engineer for all reinforcing accessories proposed for use.
- C. Material Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by Architect/Structural Engineer. Certificates shall be signed by manufacturer/Contractor certifying each material item complies with, or exceeds specified requirements.
- D. Substitutions: Any request for product or material substitution must be submitted for review, with all necessary documentation, a minimum of ten (10) days prior to time of bid. No requests for substitutions will be considered after bids have been received.
- E. Grout Mix Design: Submit written reports/laboratory tests of each proposed grout mix for each type of grout, **NOT LESS THAN FOURTEEN (14)** days prior to start of work. Either the "Field Experience Method" or "Laboratory Trial Batch Method" shall be used to proportion grout mix

designs in accordance with procedures in referenced ACI standards. The grout mix designs shall conform to the requirements of this specification and ACI 301 and ASTM C-476.

1. Mix designs prepared more than twenty four (24) months prior to the date submitted for review are **not acceptable**.

F. **Changes and Deviations:** After review, neither products nor construction requirements indicated on the shop drawings may be changed or deviated from. Changes following shop drawing review may be requested by the Contractor in writing, separate from shop drawings and shall clearly delineate requested change. Contractor shall not proceed with any requested changes until notified by Architect/Structural Engineer, in writing, of acceptability.

PART 2 - PRODUCTS

2.1 MASONRY MATERIALS:

A. **General:** Refer to Division 04 – Masonry for general and other requirements. Obtain masonry units from one manufacturer for each class, grade, type, size, finish, or color as required in related specification sections or as identified on the drawings. Provide special shapes where required in related specification sections or on the drawings.

B. **Reinforced Concrete Masonry Units:** Manufacturer's standard units with nominal face dimensions of 16" long x 8" (15-5/8" x 7-5/8" actual), unless indicated otherwise in related specification sections or on the drawings. Construct lintels using reinforced concrete masonry units with grouted joints where shown. Lintels may be prefabricated for incorporation into the work.

1. **Solid Load-Bearing Units:** ASTM C-145, Type 2, Grade N-2; where shown as 75% solid or as "solid" with concrete masonry unit minimum net area strength f'c of 2000 psi in accordance with ASTM C-140. Compressive strength f'm of 1500 psi is required.

- a. **Concrete Building Brick:** ASTM C-145, Type 2, Grade N-2 where indicated or where required to obtain indicated construction with concrete masonry unit minimum net area strength f'c of 2000 psi in accordance with ASTM C-140. Compressive strength f'm of 1500 psi is required.

2. **Hollow Load-Bearing Units:** ASTM C-90, Grade N-2 lightweight units where indicated as "Hollow-CMU" with concrete masonry unit minimum net area strength f'c of 2000 psi in accordance with ASTM C-140. Compressive strength f'm of 1500 psi is required.

- a. **"Ivany" (or "Rebar Block") Block Units:** ASTM C-90, Grade N-2 where indicated as "Ivany" or "Rebar Block" units with concrete masonry unit minimum net area strength f'c of 3750 psi in accordance with ASTM C-140. Compressive strength f'm of 2500 psi is required.

3. **Dry Density:** Dry net unit density of units shall not exceed the values indicated for the unit weight specified unless indicated otherwise.

- a. Air-dry unit weights of all units shall not exceed the weights noted below. **Design of building structure is based on units of these densities:**

1) Lightweight Units 105 pcf

Size	Hollow	75% Solid
4 x 8 x 16	22 lbs.	24 lbs.
6 x 8 x 16	27 lbs.	37 lbs.
8 x 8 x 16	35 lbs.	51 lbs.
12 x 8 x 16	49 lbs.	77 lbs.

2) Mediumweight Units 120 pcf

Size	Hollow	75% Solid
4 x 8 x 16	20 lbs.	28 lbs.
6 x 8 x 16	25 lbs.	37 lbs.
8 x 8 x 16	33 lbs.	48 lbs.
12 x 8 x 16	47 lbs.	71 lbs.

3) Normalweight Units 145 pcf

4. Lightweight Unit Aggregate: Lightweight unit aggregate shall conform to ASTM C-331 and shall be 100% "Solite", "Stalite", or approved equal and shall be graded to assure constant texture. The producer of the concrete masonry units shall furnish a letter of certification stating that all aggregate used in the manufacturer of the units was expanded and produced by rotary kiln process, 100% "Solite" or "Stalite" or approved equal conforming to ASTM C-331.
5. Prohibited Aggregates: Coal cinder aggregate (bottom ash) or similar waste products, or the blending of screenings, or any other deleterious substance which will impair the appearance, performance, fire rating, or insulation value **IS PROHIBITED**. All units shall be free of all combustible matter and any impurities that may cause rusting, staining, or "pop outs".
6. Random Sampling: A random sample of the concrete masonry units may be taken and tested by an independent lab to assure that the concrete masonry units conform to all specifications.
7. Fire Rating Requirements: Solid, 75% or greater, concrete masonry units shall meet U.L. Classification requirements for a listed fire rating of no less than four (4) hours. All 8" or larger units shall meet U.L. Classification D-2 requirements for two hours or better rating (as required) and certificates shall be furnished to the architect prior to any concrete masonry work.

2.2 MORTAR:

- A. General: Use Type S as a minimum for all reinforced masonry work, unless indicated otherwise for Type M.
- B. Mortar shall conform to ASTM C-270 for strength at twenty-eight days. Mortar shall have a minimum compressive strengths of:
 1. 1800 psi for Type S – typically required unless noted otherwise
 2. 2500 psi for Type M – where specifically required per drawings

2.3 GROUT:

- A. General: Use fine or coarse aggregate grout in accordance with the requirements of the drawings and herein with respect to minimum grout space dimensions.
- B. Grout Materials: ASTM C-476, and as herein specified.
- C. Masonry Grout Aggregates: ASTM C-404, and as herein specified; provide aggregates from single source unless permitted otherwise by Structural Engineer. Aggregate size shall be in accordance with the drawings and as noted herein.
 1. Fine masonry grout #4 stone (3/16" max.)
 2. Coarse masonry grout..... #8 stone (3/8" max.)
 3. Concrete (per Section 033000) #78M stone (1/2" max.)
- D. Grout Strength: Grout strength shall be provided as indicated on the drawings or as specified herein and tested in accordance with ASTM C-1019 and as specified herein.
- E. Grout Slump: Grout shall a maximum slump varying from 8" for low absorption masonry units to 11" for high absorption masonry units. All grout utilizing high range water-reducing admixture shall arrive at the jobsite with a slump of 3" to 4", verified by ITL, then high range water reducing admixture is to be added to increase slump to desired level, not to exceed 11".

- F. Water: Potable and containing no more chloride ions than are normally found in available local municipal water supplies.
- G. Grout Admixtures: High range water-reducing admixture (superplasticizer) shall be used in all grout utilized in high lift grouting. Either water-reducing admixture or high range water-reducing admixture shall be used in all other grout.
1. Water Reducing Admixture: ASTM C-494, Type A, and containing not more than 0.05% chloride ions. "Eucon WR-75" or "Eucon WR-89" by Euclid Chemical; "Pozzolith 200N" or "Polyheed" by Master Builders; "WRDA-Hycol" by W.R. Grace; "Plastocrete 161" or "Plastiment NS" by Sika Corporation; "PSI N" by Cormix Construction Chemicals.
 2. High Range Water Reducing Admixture (Superplasticizer): ASTM C-494, Type F or G, and containing not more than 0.05% chloride ions. "Eucon 37" by Euclid Chemical; "Sikament 300" by Sika Corporation; "Daracem 100" or "WRDA-19" by W. R. Grace; "PSI Super" by Cormix Construction Chemicals; "Rheobuild 1000" by Master Builders.
 3. Non-Corrosive/Non-Chloride Accelerator Admixture: ASTM C-494, Type C or E, non-corrosive non-chloride and containing not more than 0.05% chloride ions. "Accelegard 80" by Euclid Chemical; "Pozzutec 20" by Master Builders; "Gilco Accelerator" by Cormix Construction Chemicals; "Plastocrete 161HE" or "Plastocrete 161FL" by Sika Corporation; "Daraset" by W.R. Grace. The admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least one year duration) using an acceptable accelerated corrosion testing method such as that using electrical potential measurements.
 4. Water Reducing/Retarding Admixture: ASTM C-494, Type D, and containing not more than 0.05% chloride ions. "Eucon Retarder 75" by Euclid Chemical; "Pozzolith 300-R" by Master Builders; "Plastiment" by Sika Corporation; "Daratar-17" by W. R. Grace.
 5. Prohibited Admixtures: Calcium chloride, thiocyanates, or any admixtures containing more than 0.05% chloride ions are not permitted. Written conformance to above-mentioned requirements and chloride ion content of admixture will be required from admixture manufacturer prior to mix design review by Structural Engineer.
 6. Certification: Written conformance to the preceding requirements and chloride ion content of the admixture will be required from the admixture manufacturer prior to grout mix design review by the Structural Engineer.

2.4 MASONRY REINFORCEMENT:

- A. General: Comply with this specification for placing reinforcement. Comply with Division 03, Section 03 20 00 Concrete Reinforcing for other requirements. Shop fabricate, whenever possible, reinforcing bars shown as bent or hooked.
1. Deformed Bars: Provide ASTM A-615 Grade 60 deformed bars for #3 thru #11 bar sizes. Except provide ASTM A-615 Grade 60S where field bending of reinforcement is required or intended, and ASTM A-706 Grade 60 for all conditions where welding of reinforcement is required.
 2. Smooth Steel Wire: Provide ASTM A-675 Grade 80 for all #2 bars of smooth, round stock, where noted on the drawings for use in columns or pilasters as ties.
 3. Deformed Steel Wire: ASTM A-496 Grade 70 (minimum) deformed, where noted on the drawings for use in columns or pilasters as ties, or in beams as stirrups, or as horizontal wall reinforcing.

2.5 MASONRY ACCESSORIES:

- A. General: Provide accessories and other items as required herein and in related specification sections and as indicated on the drawings. For all types of accessories, hot-dip galvanize after fabrication with 1.5 oz. zinc coating, ASTM A-153, Class B2.
- B. Prefabricated Joint Reinforcing: Provide ASTM A-951 continuous welded wire units prefabricated in straight lengths of not less than 10', with matching corner and tee units. Fabricate from cold-drawn steel wire complying with ASTM A-82, deformed continuous plain 9 gage side rods and cross-rods, unit width of 1-1/2" less than thickness of wall/partition. Subject to compliance, provide products manufactured by "Dur-O-Wall", "AA Wire Products Company", or approved equal.

1. Single Width Walls: Ladder type fabricated with 9 gage side rods and cross-rods.
 2. Exterior Walls (composite): Ladder type with adjustable ties fabricated with single pair 9 gage side rods; 9 gage cross-rods. Adjustable 2-piece wall tie component fabricated from 9 gage rods in rectangular shape. Eye section attached to ladder unit 24" o/c horizontally; loose pintle section laid with outer wythe of face brick.
- C. Reinforcing Bar Supports/Positioners: Provide reinforcing bar supports/positioners in walls, bond beams, and lintels to accurately position horizontal and vertical reinforcement. Fabricate from cold-drawn plain 9 gage steel wire complying with ASTM A-82. Subject to compliance, provide products manufactured by "Dur-O-Wall", "AA Wire Products Company", or approved equal.
- D. Masonry Anchors and Ties: Provide straps, bars, bolts, rods, dovetail slots, metal fasteners indicated and other required accessory items of type, size, spacing, and at locations as required in related specification sections as identified on the drawings. Where masonry is indicated to be anchored to structural framework with flexible anchors, provide 2-piece anchors which will permit horizontal and vertical movement but will provide lateral restraint out of plane of wall.
- E. Contraction Joint Material: Unless otherwise required, provide contraction joint material that conforms to one of the following standards:
1. ASTM D-2000, M2AA-805 Rubber shear keys with a minimum durometer hardness of 80.
 2. ASTM D-2287, Type PVC 654-4 PVC shear keys with a minimum durometer hardness of 85.
 3. ASTM C-920
- F. Expansion Joint Material: Unless otherwise required, provide expansion joint material that conforms to one of the following standards:
1. ASTM C-920
 2. ASTM D-994
 3. ASTM D-1056, Class 2A1
- G. Related Masonry Items: Provide joint fillers, insulation, flashing, weep holes, and other items related to masonry work as required in related specification sections and as identified on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. General: Build masonry construction as required in related specification sections and as identified on the drawings. Build masonry construction to full thickness shown, except, single-wythe walls to actual thickness of masonry units, using units of nominal thickness shown or specified.
1. Do not use frozen materials or materials mixed/coated with ice or frost. For masonry specified to be wetted, comply with other Division 04 – Masonry requirements. Do not build on frozen work. Remove and replace masonry work damaged by frost or freezing. Refer to paragraph below entitled "WEATHER CONDITIONS" for both cold and hot weather procedures.
 2. Wet brick masonry units made from clay or shale which have ASTM C-67 initial rates of absorption (suction) of more than 30 grams per square inch per minute. Ensure each clay masonry unit is nearly saturated but surface dry when laid. Do not wet concrete masonry units (CMU).

3.2 WEATHER CONDITIONS:

- A. Cold Weather Construction: Implement the following requirements when the ambient temperature falls below 40°F or the temperature of masonry units is below 40°F:

1. Do not lay masonry units having a temperature below 20°F.
 2. Remove visible ice on masonry units before the unit is laid in the masonry.
 3. Heat mortar, sand, or mixing water to produce mortar with temperatures between 40°F and 120°F at the time of mixing. Maintain mortar above freezing until used in masonry.
 4. When ambient temperature is between 25°F and 20°F use heat sources on both sides of the masonry under construction and install windbreaks when wind velocity is in excess of 15 mph.
 5. When ambient temperature is below 20°F, provide an enclosure for the masonry under construction and use heat sources to maintain temperatures above 32°F within the enclosure.
 6. When mean daily temperature is between 40°F and 32°F protect completed masonry from rain or snow by covering with a weather- resistive membrane for 24 hr after construction.
 7. When mean daily temperature is between 32°F and 25°F completely cover completed masonry with a weather-resistive membrane for 24 hr after construction.
 8. When mean daily temperature is between 25°F and 20°F completely cover completed masonry with insulating blankets or equal protection for 24 hr after construction.
 9. When mean daily temperature is below 20°F, maintain masonry temperature above 32°F for 24 hr after construction by enclosure with supplementary heat, by electric heating blankets, by infrared heat lamps, or by other acceptable methods.
- B. Hot Weather Construction: Implement approved hot weather procedures and comply with the following provisions:
1. When ambient air temperature exceeds 100°F or 90°F with wind velocity greater than 8 mph:
 - a. Maintain sand piles in a damp, loose condition.
 - b. Provide necessary conditions and equipment to produce and maintain mortar and grout having a temperature below 120°F.
 - c. Flush mixer, mortar transport container, and mortar boards with cool water before they come into contact with mortar ingredients or mortar.
 - d. Maintain mortar consistency by retempering with cool water.
 - e. Use mortar within 2 hr. of initial mixing.
 - f. Fog spray all newly constructed masonry until damp, at least three times a day until the masonry is three days old.
 2. When ambient temperature exceeds 115°F or 105°F with a wind velocity greater than 8 mph implement the above paragraph and:
 - a. Shade mortar and grout materials and mixing equipment from direct sunlight.
 - b. Use cool mixing water for mortar and grout. Ice is permitted in the mixing water prior to use. Do not permit ice in the mixing water when added to the other mortar or grout materials.
- C. Mortar: Comply with requirements of Division 04 – Masonry.
- D. Reinforced Concrete Masonry Unit Walls: Lay CMU wall units in 1/2-running bond with vertical joints in each course centered on units above and below, unless otherwise indicated. Bond and interlock each course at corners and intersections. Use special shaped units where shown, and as required for corners, jambs, sash, control joints, lintels, bond beams, and other special conditions.
1. Maintain vertical continuity of core or cell cavities that are to be reinforced and grouted. Keep cavities free of mortar. Solidly bed masonry webs with mortar where adjacent to cells to be grouted.
 2. Use special units or modify standard units, where horizontal reinforcing is shown to provide for continuous placement of reinforcing and grout. Place small mesh expanded metal lath or wire screening in joints under bond beam courses above cells of non-reinforced or non-grouted masonry elements or provide bond beam units with solid bottoms (lintel block units). Provide open-end bond beam units where horizontal and vertical reinforcing pass through same unit.

3.3 CONSTRUCTION TOLERANCES:

A. Erect masonry work within the following tolerances from dimensions shown on the drawings:

1. Dimensions of individual elements:
 - a. Cross section or elevation $-\frac{1}{4}'' : +\frac{1}{2}''$
 - b. Mortar bed joints $\pm\frac{1}{8}''$
 - c. Mortar head and collar joints $-\frac{1}{4}'' : +\frac{3}{8}''$
 - d. Grout space or cavity width $-\frac{1}{4}'' : +\frac{3}{8}''$
2. Construction of elements:
 - a. Variation from level of mortar bed joints:
 - 1) Over 10 ft..... $\pm\frac{1}{4}''$
 - 2) Maximum..... $\pm\frac{1}{2}''$
 - b. Variation from level of top surface of bearing walls:
 - 1) Over 10 ft..... $\pm\frac{1}{4}''$
 - 2) Maximum..... $\pm\frac{1}{2}''$
 - c. Variation from plumb:
 - 1) Over 10 ft..... $\pm\frac{1}{4}''$
 - 2) Over 20 ft..... $\pm\frac{3}{8}''$
 - 3) Maximum..... $\pm\frac{1}{2}''$
 - d. True to a line:
 - 1) Over 10 ft..... $\pm\frac{1}{4}''$
 - 2) Over 20 ft..... $\pm\frac{3}{8}''$
 - 3) Maximum..... $\pm\frac{1}{2}''$
 - e. Bottom versus top alignment of columns and walls:
 - 1) Bearing walls..... $\pm\frac{1}{2}''$
 - 2) Non-bearing walls..... $\pm\frac{3}{4}''$
3. Location of elements:
 - a. As indicated in plan:
 - 1) Over 20 ft..... $\pm\frac{1}{2}''$
 - 2) Maximum..... $\pm\frac{3}{4}''$
 - b. As indicated in elevation:
 - 1) Over story height..... $\pm\frac{1}{4}''$
 - 2) Accumulated maximum (full height)..... $\pm\frac{3}{4}''$
4. Existing Construction: Contractor shall survey and evaluate existing conditions prior to starting work. Where any of the tolerances indicated above cannot be achieved due to conditions in existing construction, Contractor shall notify Architect/Engineer and await direction prior to beginning any work that would or could be affected by attempting to comply with above tolerances.

3.4 REINFORCEMENT:

- A. General: Clean reinforcement of loose rust, mill scale, earth, ice, or other materials that will reduce bond to mortar or grout. Do not use reinforcement with kinks or bends not shown on drawings or final shop drawings, or bars with reduced cross-section due to excessive rusting or other causes. Position reinforcement accurately at spacing shown. All reinforcing shall be completely embedded in grout in accordance with the tolerances and procedures indicated herein and ACI 530.
- B. Detailing and Placement Tolerances: Place reinforcement and accessories in accordance with the sizes, types, and locations indicated on the Drawings, and as herein specified. Do not place dissimilar metals in contact with each other. Support and secure all reinforcing against displacement. Provide and maintain location and clearances and hold in position within the tolerances as follows:

1. Location within walls and flexural elements:
 - a. For nearest face 8" or less..... $\pm\frac{1}{2}$ "
 - b. For nearest face between 8" and 24" ± 1 "
 - c. For nearest face further than 24"..... $\pm 1\frac{1}{4}$ "
 - d. Vertical location along horizontal length ± 2 "

 2. Clearance within masonry elements:
 - a. From face with fine grout $\pm\frac{1}{4}$ "
 - b. From face with coarse grout $\pm\frac{1}{2}$ "
 - c. Between adjacent wall or beam bars:
 - 1) Not less than 1 bar diameter
 - 2) Minimum 1"

 - d. Between adjacent column, pier, or pilaster bars:
 - 1) As indicated but not less than $1\frac{1}{2}$ bar diameters
 - 2) Minimum 1"

 3. Support reinforcing at intervals:
 - a. Vertical reinforcing
 - 1) Top and bottom and not exceeding 192 bar diameters
 - 2) Maximum 10'-0"

 - b. Horizontal reinforcing:
 - 1) Each end and not exceeding..... 100 bar diameters

 4. Provide lateral ties as indicated in the details.
 5. All dowels shall be grouted even if the dowel is in a cell adjacent to the vertical reinforcing. Unless detailed otherwise on the drawings, dowels shall be the same size, number, and spacing as the vertical reinforcing. Provide lap length of dowels to vertical reinforcing equal to forty-eight (48) times nominal diameter of dowel, unless indicated otherwise on the drawings. Dowels for columns and pilasters shall be installed using steel or wood templates to accurately position dowels as indicated on the drawings.
 6. Provide laps or dowels around corners and across intersections as indicated on the drawings.
- C. Horizontal reinforcing: Shall be placed in continuous bond beam or lintel block units and shall be solidly grouted in place. Horizontal reinforcement shall be **DISCONTINUOUS THROUGH CONTROL JOINTS** and **EXPANSION JOINTS**. Horizontal reinforcement may be placed as masonry work progresses.
- D. Splices: Splice reinforcement where shown or indicated on the drawings. Do not splice at other locations unless acceptable to the Structural Engineer. Where splicing at vertical bars or at dowels, provide full contact, lap ends of bars, and wire tie.
1. Refer to the drawings for splice/lap lengths required for each bar size.
- E. Reinforcing Bar Positioners: Provide where required and at required spacing to support and secure horizontal and vertical reinforcing against displacement and to accurately align and position splices in reinforcement.
- F. Prefabricated Joint Reinforcing: Provide continuous horizontal joint reinforcing as shown/specified. Fully embed longitudinal side rods in mortar for entire length with minimum cover of 5/8" on exterior side of walls and 1/2" at other locations. Lap reinforcement a minimum of 6" at ends of units. Do not bridge control/expansion joints with joint reinforcing. Provide continuity at corners/wall intersections by the use of prefabricated "L" and "T" sections. Cut/bend units as directed by manufacturer for continuity at returns/offsets/column fireproofing, pipe enclosures, and/or special conditions. Space continuous horizontal reinforcing as follows:

1. For multi-wythe walls (solid composite or cavity) where continuous horizontal reinforcing also acts as structural bond or tie between wythes, space as required by code but not less than 16" o/c vertically.
 2. For single-wythe walls, space at 16" o/c vertically, unless indicated.
 3. For parapets, space at 8" o/c vertically, unless indicated.
- G. Metal Ties: Where indicated, install in mortar joints as work progresses, with a minimum mortar cover of at least 5/8" on exterior faces and 1/2" on interior faces of masonry work.
- H. Anchors: Install anchors for reinforced masonry elements to supporting structure as indicated on the drawings or required in the specifications.

3.5 GROUTING:

- A. General: Grout mix and grout materials shall conform to ASTM C-476.
1. Mortar Grout: Use mortar only for filling cavities less than 3/4" in width or spaces less than 1-1/2"x2" in horizontal dimensions. Mortar is not permitted as "grout" for larger cavities or spaces.
 2. Fine Grout: Use for filling spaces less than 2" in either horizontal dimension. Aggregate size shall not exceed 3/16" maximum dimension.
 3. Coarse Grout: Use for filling cavities 2" or larger in width or cells 2"x3" or larger in horizontal dimensions. Aggregate size shall not exceed 3/8" maximum dimension.
 4. Concrete: Use 3000 psi normal weight aggregate concrete, for filling spaces ten (10) inches or larger in both horizontal dimensions. Aggregate size shall not exceed 3/4" maximum dimension. Refer to Section 033000 "Cast-in-Place Concrete" for concrete requirements including testing.
- B. Preparation: Prior to grouting, inspect and clean grout spaces. Remove dust, dirt, mortar droppings, loose pieces of masonry, and other foreign materials. Clean and position reinforcing. Clean top surface of structural members to ensure bond. After final cleaning and inspection, close and brace cleanout holes.
1. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist forces and pressures of grouting operation. Install shores and braces, if required, before beginning grouting.
- C. Cold Weather Grouting: No grouting shall be performed unless temperature of surrounding air is 32 degree F and rising. No grouting shall be performed if water will freeze when poured onto reinforcing bars. Remove any ice/snow blocking openings in masonry to be grouted.
1. Use of accelerating admixtures, superplasticizer, and other admixtures in grout shall be permitted as provided under Section 033000 "Cast-in-Place Concrete". Use of "anti-freeze" **IS PROHIBITED**.
 2. Provide temporary protection of grouted masonry to insure a minimum 48 hours curing at a minimum 32 degree F. When air temperature is between 32 and 40 degree F heat aggregate, sand and mixing water to produce grout temperature between 40 degree F and 120 degree F.
- D. Grouting Method: Grouting shall conform to low-lift or high-lift grouting, at Contractor's option, subject to following requirements.
1. Low-Lift Grouting:
 - a. Low-Lift Grouting **SHALL NOT** exceed a pour of more than five (5) feet in height nor the "Maximum Grout Pour Height" identified below
 - b. Provide minimum clear dimension of two (2) inches and minimum clear area of eight (8) sq. inches in vertical cavities, cells, or cores to be grouted.
 - c. Place vertical reinforcement prior to laying of masonry units. Extend above elevation of maximum pour height as required to allow for splicing. Support and secure reinforcing as masonry is built.

- d. Lay masonry to maximum pour height. Do not exceed five feet (5 ft.) or if bond beam occurs below five feet (5 ft.) height, stop pour at course below bond beam.

2. High-Lift Grouting:

- a. High-Lift Grouting **SHALL NOT** exceed a pour of one story, but in no case more than twenty-four (24) feet in height nor the "Maximum Grout Pour Height" identified below.
- b. High-Lift Grouting is **NOT PERMITTED** unless minimum cavity dimension exceeds three (3) inches and minimum cavity area exceeds ten (10) sq. inches.
- c. Cleanout holes **ARE REQUIRED** where high-lift grouting will be employed. Provide cleanouts at the bottom course of masonry at each cell to be grouted for each pour. For solid grouted masonry space cleanouts at 32 in. o/c
- d. Cleanout holes shall have a minimum width of 3 inches and a minimum height of 6 inches. After cleaning, close cleanouts and brace closures to resist hydrostatic grout pressure.
- e. Prior to grouting, construct masonry elements and place and secure reinforcing to full height of maximum grout pour. Place horizontal bond beam reinforcing as masonry units are laid.
- f. Where lateral tie reinforcing is shown, embed in mortar joints at vertical spacing indicated as units are laid. Where lateral ties wrap vertical reinforcing, embed additional lateral tie reinforcing in mortar joints to resist hydrostatic rupture of masonry face shells. Provide not less than No. 2 bars or 8 gage wire ties spaced at 16 in. o/c for members with side dimensions of 20 in. or less and at 8 in. o/c where side dimensions exceed 20 in.

E. Maximum Grout Pour Height: In no case shall total grout pour height exceed the following heights regardless of grouting method used.

Grout Type	Max. Height	Min. Cavity	Min. Cell
Fine	1'-0"	3/4"	1-1/2" x 2"
Fine	5'-0"	2"	2" x 3"
Fine	12'-0"	2-1/2"	2-1/2" x 3"
Fine	24'-0"	3"	3" x 3"
Coarse	1'-0"	2"	2" x 3"
Coarse	5'-0"	2"	2-1/2" x 3"
Coarse	12'-0"	2-1/2"	3" x 3"
Coarse	24'-0"	3"	3" x 4"

- 1. Min. Cavity applies to grouting between wythes of cavity walls. Min. Cell applies to grouting of masonry cells where dimension shown equals grout space width minus horizontal reinforcing bar diameter.

F. Grout Placement: Limit grout pours to sections that can be completed in one working day with not more than one (1) hour of interruption of pouring operation. Allow not less than thirty (30) minutes, nor more than one (1) hour between lifts of given pour. Rod or vibrate each lift during pouring operation.

- 1. Place grout in lifts not to exceed a maximum height of five (5) feet each, regardless of the maximum height of the pour.
- 2. Place grout in lintels and beams over openings in one continuous pour.
- 3. Pour grout using chute or container with spout. Terminate pour 1-1/2" below top course to form key for next pour.
- 4. Where bond beams occur, terminate grouting of vertical cells 1-1/2" below bond beam course. After placing horizontal reinforcing and prior to filling vertical cells above bond beam, pour grout into bond beam and strike off flush with top of bond beam course.

G. Grout Consolidation: Consolidate grout at time of placement.

- 1. Consolidate pours 1'-0" or less in height by mechanical vibration or puddling.
- 2. Consolidate pours exceeding 1'-0" in height by mechanical vibration and reconsolidate by mechanical vibration after initial water loss and settlement has occurred.

3.6 OTHER ITEMS:

- A. General: Provide vertical expansion, control and isolation joints, and provide concealed flashing and weepholes in masonry where shown. Build-in related masonry accessory items as the masonry work progresses. Comply with requirements for repair, pointing and cleaning. Refer to other related specifications sections and to drawings for these requirements.

END OF SECTION 04 29 00

SECTION 06 10 00 ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies wood blocking, framing, sheathing, furring, nailers, sub-flooring, rough hardware, and light wood construction.
- B. See Architectural drawing for additional requirements, including pre-fabricated roof trusses and pre-engineered floor joist.

1.2 SUBMITTALS:

- A. Submit in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.
- B. See Structural drawing S1.0 for additional requirements.
- C. Shop Drawings showing framing connection details, fasteners, connections and dimensions.
- D. Manufacturer's Literature and Data:
 - 1. Submit data for lumber, panels, hardware and adhesives.
 - 2. Submit data for wood-preservative treatment from chemical treatment manufacturer and certification from treating plants that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 3. Submit data for fire retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
- E. Manufacturer's certificate for unmarked lumber.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Protect lumber and other products from dampness both during and after delivery at site.
- B. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.
- C. Stack plywood and other board products so as to prevent warping.
- D. Locate stacks on well drained areas, supported at least 152 mm (6 inches) above grade and cover with well-ventilated sheds having firmly constructed over hanging roof with sufficient end wall to protect lumber from driving rain.

1.4 QUALITY ASSURANCE:

- A. Installer: A firm with a minimum of three (3) years' experience in the type of work required by this section.

1.5 GRADING AND MARKINGS:

- A. Unmarked lumber or plywood will not be accepted..

PART 2 - PRODUCTS

2.1 LUMBER:

- A. Unless otherwise specified, each piece of lumber must bear grade mark, stamp, or other identifying marks indicating grades of material, and rules or standards under which produced.

1. Identifying marks are to be in accordance with rule or standard under which material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
 2. Inspection agency for lumber approved by the Board of Review, American Lumber Standards Committee, to grade species used.
- B. Structural Members: Species and grade as listed in the AFPA NDS having design stresses as shown.
- C. Lumber Other Than Structural:
1. Unless otherwise specified, species graded under the grading rules of an inspection agency approved by Board of Review, American Lumber Standards Committee.
 2. Framing lumber: Minimum extreme fiber stress in bending of 7584 kPa (1100 PSI).
 3. Furring, blocking, nailers and similar items 101 mm (4 inches) and narrower Standard Grade; and, members 152 mm (6 inches) and wider, Number 2 Grade.
 4. Board Sub-flooring: Shiplap edge, 25 mm (1 inch) thick, not less than 203 mm (8 inches) wide.
- D. Sizes:
1. Conforming to PS 20.
 2. Size references are nominal sizes, unless otherwise specified, actual sizes within manufacturing tolerances allowed by standard under which produced.
- E. Moisture Content:
1. Maximum moisture content of wood products is to be as follows at the time of delivery to site.
 - a. Boards and lumber 50 mm (2 inches) and less in thickness: 19 percent or less.
 - b. Lumber over 50 mm (2 inches) thick: 25 percent or less.
- F. Fire Retardant Treatment:
1. Comply with Mil Spec. MIL-L-19140.
 2. Treatment and performance inspection, by an independent and qualified testing agency that establishes performance ratings.
- G. Preservative Treatment:
1. Do not treat Heart Redwood and Western Red Cedar.
 2. Treat wood members and plywood exposed to weather or in contact with plaster, masonry or concrete, including framing of open roofed structures; sills, sole plates, furring, and sleepers that are less than 610 mm (24 inches) from ground; nailers, edge strips, blocking, crickets, curbs, cant, vent strips and other members provided in connection with roofing and flashing materials.
 3. Treat other members specified as preservative treated (PT).
 4. Preservative treat by the pressure method complying with AWPA Book use category system standards U1 and T1, except any process involving the use of Chromated Copper Arsenate (CCA) or other agents classified as carcinogenic for pressure treating wood is not permitted.

2.2 PLYWOOD:

- A. Comply with PS 1.
- B. Bear the mark of a recognized association or independent inspection agency that maintains continuing control over quality of plywood which identifies compliance by veneer grade, group number, span rating where applicable, and glue type.
- C. Sheathing:
 1. APA rated Exposure 1 or Exterior; panel grade CD or better.

2. Wall sheathing:
 - a. 11/32 inch thick with supports 16 inches on center and 15/32 inch thick with supports 24 inches on center unless specified otherwise.
 - b. Minimum 48 inches wide at corners without corner bracing of framing.
3. Roof sheathing:
 - a. Minimum 11/32 inch thick with span rating 15/32 inch thick with span rating for supports 16 inches on center unless specified otherwise.
 - b. Minimum 19/32 inch thick or span rating of 23/32 inch thick or span rating of 48/24 for supports 24 inches on center.

2.3 ROUGH HARDWARE AND ADHESIVES:

- A. Anchor Bolts:
 1. ASME B18.2.1 and ASME B18.2.2 galvanized, 1/2 inch unless shown otherwise.
 2. Extend at least 8 inches into masonry or concrete with ends bent 2 inches.
- B. Miscellaneous Bolts: Expansion Bolts: C1D A-A-55615; lag bolt, long enough to extend at least 2-1/2 inches into masonry or concrete. Provide 1/2 inch bolt unless shown otherwise.
- C. Washers
 1. ASTM F844.
 2. Provide zinc or cadmium coated steel or cast iron for washers exposed to weather.
- D. Screws:
 1. Wood to Wood: ASME B18.6.1 or ASTM C1002.
 2. Wood to Steel: ASTM C954, or ASTM C1002.
- E. Nails:
 1. Size and type best suited for purpose unless noted otherwise. Provide aluminum-alloy nails, plated nails, or zinc-coated nails, for nailing wood work exposed to weather and on roof blocking.
 2. ASTM F1667:
 - a. Common: Type I, Style 10.
 - b. Concrete: Type I, Style 11.
 - c. Barbed: Type I, Style 26.
 - d. Underlayment: Type I, Style 25.
 - e. Masonry: Type I, Style 27.
 - f. Provide special nails designed for use with ties, strap anchors, framing connectors, joists hangers, and similar items. Nails not less than 1-1/4 inches long, 8d and deformed or annular ring shank.
- F. Framing and Timber Connectors:
 1. Fabricate of ASTM A653/A653M, Grade A; steel sheet not less than 0.052 inch thick unless specified otherwise. Apply standard plating to steel timber connectors after punching, forming and assembly of parts.
 2. Framing Angles: Angle designed with bendable legs to provide three (3) way anchors.
 3. Straps:
 - a. Designed to provide wind and seismic ties with sizes as shown or specified.
 - b. Strap ties not less than 1-1/4 inches wide.

- c. Punched for fastener.
- G. Adhesives:
- 1. For field-gluing plywood to lumber framing floor or roof systems: ASTM D3498.
 - 2. For structural laminated Wood: ASTM D2559.

PART 3 - EXECUTION

3.1 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS:

- A. Conform to applicable requirements of the following:
- 1. AFPA WCD1 for nailing and framing unless specified otherwise.
 - 2. APA for installation of plywood or structural use panels.
 - 3. TPI for metal plate connected wood trusses.
- B. Fasteners:
- 1. Nails.
 - a. Nail in accordance with the Recommended Nailing Schedule as specified in AFPA WCD1 where detailed nailing requirements are not specified in nailing schedule. Select nail size and nail spacing sufficient to develop adequate strength for the connection without splitting the members.
 - b. Use special nails with framing connectors.
 - c. For sheathing and subflooring, select length of nails sufficient to extend 1 inch into supports.
 - d. Use 8d or larger nails for nailing through 1 inch thick lumber and for toe nailing 2 inch thick lumber.
 - e. Use 16d or larger nails for nailing through 2 inch thick lumber.
 - f. Select the size and number of nails in accordance with the Nailing Schedule except for special nails with framing anchors.
 - g. Nailing Schedule; Using Common Nails:
 - 1) Joist bearing on sill or girder, toe nail three (3) 8d nails or framing anchor.
 - 2) Bridging to joist, toe nail each end two (2) 8d nails.
 - 3) Ledger strip to beam or girder three (3) 16d nails under each joint.
 - 4) Sheathing:
 - a) 6 inch wide or less to each joist face nail two (2) 8d nails.
 - b) Subflooring, more than 6 inches wide, to each stud or joint, face nail three (3) 8d nails.
 - c) Plywood or structural use panel to each stud or joist face nail 8d, at supported edges 6 inches on center and at intermediate supports 10 inches on center. When gluing plywood to joint framing increase nail spacing to 12 inches at supported edges and 20 inches o.c. at intermediate supports.
 - 5) Top plate to stud, end nail two (2) 16d nails.
 - 6) Stud to sole plate, toe nail or framing anchor. Four (4) 8d nails.
 - 7) Doubled studs, face nail 16d at 16 inches on center.
 - 8) Built-up corner studs 16d at 16 inches on center.
 - 9) Doubled top plates, face nails 16d at 16 inches on center.

- 10) Top plates, laps, and intersections, face nail two (2) 16d.
 - 11) Continuous header, two pieces 16d at 16 inches on center along each edge.
 - 12) Continuous header to stud, four (4) 16d.
 - 13) Rafter to plate, toe nail three (3) 8d or framing anchor. Brace 1 inch thick board to each stud and plate, face nail three (3) 8d.
2. Bolts:
 - a. Fit bolt heads and nuts bearing on wood with washers.
 - b. Countersink bolt heads flush with the surface of nailers.
 - c. Embed in concrete and solid masonry or provide expansion bolts. Special bolts or screws designed for anchor to solid masonry or concrete in drilled holes may be used.
 - d. Provide toggle bolts to hollow masonry or sheet metal.
 3. Drill Screws to steel less than 0.112 inch thick.
 - a. ASTM C1002 for steel less than 0.033 inch thick.
 - b. ASTM C954 for steel over 0.033 inch thick.
 4. Power actuated drive pins may be provided where practical to anchor to solid masonry, concrete, or steel.
 5. Do not anchor to wood plugs or nailing blocks in masonry or concrete. Provide metal plugs, inserts or similar fastening.
 6. Screws to Join Wood:
 - a. Where shown or option to nails.
 - b. ASTM C1002, sized to provide not less than 1 inch penetration into anchorage member.
 - c. Spaced same as nails.
- C. Cut notch, or bore in accordance with AFPA WCD1 passage of ducts wires, bolts, pipes, conduits and to accommodate other work. Repair or replace miscut, misfit or damaged work.
- D. Blocking Nailers, and Furring:
1. Install furring, blocking, nailers, and grounds where shown.
 2. Provide longest lengths practicable.
 3. Provide fire retardant treated wood blocking where shown at openings and where shown or specified.
 4. Layers of Blocking or Plates:
 - a. Stagger end joints between upper and lower pieces.
 - b. Nail at ends and not over 610 mm (24 inches) between ends.
 - c. Stagger nails from side to side of wood member over 127 mm (5 inches) in width.
- E. Roof Framing:
1. See Structural drawings S1.0 for prefabricated wood roof truss design, shop drawings and erection.
- F. Interior Partition and Wall Framing:
1. Provide 2 inch by 4 inch studs spaced 16 inches on centers; unless otherwise indicated on contract documents. Exterior wall framing is to be 2 inch by 4 inch studs spaced 16 inches on center.
 2. Install double studs at openings and triple studs at corners.
 3. Installation of sole plate:

- a. Anchor plates of walls or partitions resting on concrete floors in place with expansion bolts, one (1) near ends of piece and at intermediate intervals of not more than 4 feet or with power actuated drive pins with threaded ends of suitable type and size, spaced 2 feet on center unless shown otherwise.
 - b. Nail plates to wood framing through subfloor as specified in nailing schedule.
4. Headers or Lintels:
- a. Make headers for openings of two (2) pieces of 2 inch thick lumber of size shown with plywood filler to finish flush with face of studs or solid lumber of equivalent size.
 - b. Support ends of headers on top of stud cut for height of opening. Spike cut stud to adjacent stud. Spike adjacent stud to header.
5. Provide double top plates, with members lapped at least 2-feet spiked together.
6. Install intermediate cut studs over headers and under sills to maintain uniformity of stud spacing.
7. Provide single sill plates at bottom of opening unless otherwise indicated in contract documents. Toe nail to end stud, face nail to intermediate studs.
8. Install 2 inch blocking for firestopping so that maximum dimension of any concealed space is not over 8 feet in accordance with AFPA WCD1.
9. Install corner bracing when plywood or structured use panel sheathing is not used.
- a. Let corner bracing into exterior surfaces of studs at an angle of approximately 45 degrees, extended completely over walls plates, and secured at bearing with two (2) nails.
 - b. Provide 1 inch by 4 inch corner bracing.
- G. Rough Bucks:
1. Install rough wood bucks at opening in masonry or concrete where wood frames or trim occur.
 2. Brace and maintain bucks plumb and true until masonry has been built around them or concrete cast in place.
 3. Cut rough bucks from 2 inch thick stock, of same width as partitions in which they occur and of width shown in exterior walls.
 4. Extend bucks full height of openings and across head of openings; fasten securely with anchors specified.
- H. Sheathing:
1. Provide plywood or structural-use panels for sheathing.
 2. Lay panels with joints staggered, with edge and ends 1/8 inch apart and nailed over bearings as specified.
 3. Set nails not less than 3/8 inch from edges.
 4. Install 2 inch by 4 inch blocking spiked between joists, rafters and studs to support edge or end joints of panels.

END OF SECTION 06 10 00

SECTION 06 20 00 PLASTIC LAMINATE COUNTERTOPS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies plastic laminate countertops.

1.2 SUBMITTALS

- A. Shop Drawings showing construction and installation of new countertops and backsplashes.
- B. Plastic laminate selection samples.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Protect lumber and millwork from dampness, maintaining moisture content specified both during and after delivery at site.
- B. Store finishing lumber and millwork in weathertight well-ventilated structures. Store at a minimum temperature of 21°C (70°F) for not less than 10 days before installation.
- C. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.

PART 2 – PRODUCTS

2.1 LUMBER

- A. Grading and Marking:
 - 1. Lumber shall bear the grade mark, stamp, or other identifying marks indicating grades of material.
 - 2. Such identifying marks on a material shall be in accordance with the rule or standard under which the material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
 - 3. The inspection agency for lumber shall be approved by the Board of Review, American Lumber Standards Committee, to grade species used.
- B. Sizes:
 - 1. Lumber Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which product is produced.

2.2 PLYWOOD

- A. Softwood Plywood:
 - 1. Grading and Marking:

- a. Each sheet of plywood shall bear the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the plywood.
 - b. The mark shall identify the plywood by species group or identification index, and shall show glue type, grade, and compliance with PS1.
2. Plywood, 13 mm (1/2 inch) and thicker; not less than five ply construction, except 32 mm (1-1/4 inch) thick plywood not less than seven ply.
 3. Plastic Laminate Plywood Cores:
 - a. Exterior Type, and species group.
 - b. Veneer Grade: A-C.

2.3 PLASTIC LAMINATE

- A. NEMA LD-3.
- B. For countertops: General Purpose, Type HGL.
- C. Colors to be selected from manufacturer's standard line.

2.4 ADHESIVE

- A. For Plastic Laminate: Fed. Spec. A-A-1936.

2.5 MOISTURE CONTENT

- A. Moisture content of millwork at time of delivery to site.
 1. Interior finish lumber, trim, and millwork 32 mm (1-1/4 inches) or less in nominal thickness: 12 percent on 85 percent of the pieces and 15 percent on the remainder.

2.6 FABRICATION

- A. General:
 1. Except as otherwise specified, use AWI Custom Grade for architectural woodwork and interior millwork.
 2. Finish woodwork shall be free from pitch pockets.
 3. Plywood shall be not less than 13 mm (1/2 inch), unless otherwise shown or specified.
 4. Fabricate members less than 4 m (14 feet) in length from one piece of lumber, back channeled and molded as shown.
 5. Interior trim and items of millwork to be painted may be fabricated from jointed, built-up, or laminated members, unless otherwise shown on drawings or specified.
 6. Plastic Laminate Work:
 - a. Factory glued to either a plywood or a particle board core, thickness as shown or specified.

- b. Cover all exposed edges with plastic laminate.
- c. Colors and patterns to be selected from manufacturer's standard line.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

- A. Maintain work areas and storage areas to a minimum temperature of 21°C (70°F) for not less than 10 days before and during installation of interior millwork.
- B. Do not install finish lumber or millwork in any room or space where wet process systems such as concrete, masonry, or plaster work is not complete and dry.

3.2 INSTALLATION

- A. General:
 - 1. Seal cut edges of preservative and fire-retardant treated wood materials with a certified acceptable sealer.
 - 2. Coordinate with plumbing and electrical work for installation of fixtures and service connections in millwork items.
 - 3. Plumb and level items unless shown otherwise.
 - 4. Nail finish at each blocking, lookout, or other nailer and intermediate points; toggle or expansion bolt in place where nails are not suitable.

END OF SECTION 06 20 00

SECTION 06 41 13 PLASTIC-LAMINATE-CLAD WOOD CABINETS

PART 1 GENERAL

1.1 DESCRIPTION

- A. This section specifies plastic-laminate clad wood base cabinets and wall cabinets located at the break rooms.
- B. Countertops in break room are plastic laminate (as indicated on drawings).

1.2 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ANSI A161.2	(1998) Decorative Laminate Countertops, Performance Standards for Fabricated High Pressure
AWI AWS	(2nd Edition) Architectural Woodwork Standards
ASTM D1037	(2012) Evaluating Properties of Wood-Base Fiber and Particle Panel Materials
ASTM E84	(2018) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM F547	(2017) Standard Terminology of Nails for Use with Wood and Wood-Base Materials
ANSI/BHMA A156.9	(2015) Cabinet Hardware
CPA A208.1	(2016) Particleboard
CPA A208.2	(2016) Medium Density Fiberboard (MDF) for Interior Applications
ANSI/NEMA LD 3	(2005) Standard for High-Pressure Decorative Laminates

1.3 SUBMITTALS

- A. Shop Drawings: Provide shop drawings for all base cabinets, wall cabinets and countertops. Provide elevation, sections and details as required to fully illustrate construction methods and materials. Show and indicate all anchors and fasteners.
- B. Samples: Provide plastic laminate selector chain, door and drawer pull, drawer slide and door hinge.
- C. Manufacturer's written warranty.
- D. Technical Data: Provide technical data, for plastic laminate, showing compliance with specifications.

1.3.1 QUALITY ASSURANCE

- A. Unless otherwise noted on the drawings, all materials, construction methods, and fabrication shall conform to and comply with the premium or custom grade quality standards as outlined in AWI AWS, Section for laminate clad cabinets.
- B. These standards shall apply in lieu of omissions or specific requirements in this specification.
- C. Contractors and their personnel engaged in the work shall be able to demonstrate successful experience with work of comparable extent, complexity and quality to that shown and specified.
- D. Submit a quality control statement which illustrates compliance with and understanding of AWI AWS requirements, in general, and the specific AWI AWS requirements provided in this specification.

- E. The quality control statement shall also certify a minimum of ten years Contractor's experience in laminate clad casework fabrication and construction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Casework may be delivered knockdown or fully assembled.
- B. Deliver all units to the site in undamaged condition, stored off the ground in fully enclosed areas, and protected from damage.
- C. The storage area shall be well ventilated and not subject to extreme changes in temperature or humidity.

1.6 SEQUENCING AND SCHEDULING

- A. Coordinate work with other trades.
- B. Contractor shall field verify all blocking locations prior to concealing with gypsum board.
- C. Units shall not be installed in any room or space until painting, and ceiling installation are complete within the room where the units are located.
- D. Floor cabinets shall be installed before finished flooring materials are installed.

PART 2 PRODUCTS

2.1 WOOD MATERIALS

- A. Lumber:
 - 1. All framing lumber shall be kiln-dried Grade III to dimensions shown on the drawings. Frame front, where indicated on the drawings, shall be nominal 3/4 inch hardwood.
 - 2. AWI grade shall be premium or custom.
 - 3. Location, shape, and dimensions shall be as indicated on the drawings.
- B. Plywood:
 - 1. All plywood panels used for framing purposes shall be veneer core hardwood plywood, AWI AWS Grade AA.
 - 2. Nominal thickness of plywood panels shall be as indicated in this specification and on the drawings.
- C. Particleboard:
 - 1. All particleboard shall be industrial grade, medium density (40 to 50 pounds per cubic foot), and 3/4 inch thick.
 - 2. Moisture-resistant particleboard in grade Type 2-M-2 or 2-M-3 shall be used as the substrate for plastic laminate covered cabinets, components as located on the drawings, and other areas subjected to moisture.
 - 3. Particleboard shall meet the minimum standards listed in ASTM D1037 and CPA A208.1.

2.2 HIGH PRESSURE DECORATIVE LAMINATE (HPDL)

- A. All plastic laminates shall meet the requirements of ANSI/NEMA LD 3 and ANSI A161.2 for high-pressure decorative laminates.
- B. Design, colors, surface finish and texture will be selected from the manufacturer's standard line, through the submittal review process. Submit selector chain for Architect's use in making selections.
- C. Plastic laminate types and nominal minimum thicknesses for casework components shall be as

indicated in the following paragraphs.

1. Horizontal General Purpose Standard (HGS) Grade:
 - a. Horizontal general purpose standard grade plastic laminate shall be 0.048 inches (plus or minus 0.005 inches) in thickness.
 - b. This laminate grade is intended for horizontal surfaces where post-forming is not required.
2. Vertical General Purpose Standard (VGS) Grade:
 - a. Vertical general purpose standard grade plastic laminate shall be 0.028 inches (plus or minus 0.004 inches) in thickness.
 - b. This laminate grade is intended for exposed exterior vertical surfaces of casework components where post-forming is not required.
3. Horizontal General Purpose Post-formable (HGP) Grade:
 - a. Horizontal general purpose post-formable grade plastic laminate shall 0.042 inches (plus or minus 0.005 inches) in thickness.
 - b. This laminate grade is intended for horizontal surfaces where post-forming is required.
4. Vertical General Purpose Post-formable (VGP) Grade:
 - a. Vertical general purpose post-formable grade plastic laminate shall be 0.028 inches (plus or minus 0.004 inches) in thickness.
 - b. This laminate grade is intended for exposed exterior vertical surfaces of components where post-forming is required for curved surfaces.
5. Cabinet Liner Standard (CLS) Grade:
 - a. Cabinet liner standard grade plastic laminate shall be 0.020 inches in thickness.
 - b. This laminate grade is intended for light duty semi-exposed interior surfaces of casework components.
6. Backing Sheet (BK) Grade:
 - a. Undecorated backing sheet grade laminate is formulated specifically to be used on the backside of plastic laminated panel substrates to enhance dimensional stability of the substrate.
 - b. Backing sheet thickness shall be 0.020 inches.
 - c. Backing sheets shall be provided for all laminated casework components where plastic laminate finish is applied to only one surface of the component substrate.

2.4 THERMOSET DECORATIVE OVERLAYS (MELAMINE)

- A. Thermoset decorative overlays (melamine panels) shall be used for casework cabinet interior, drawer interior, and all semi-exposed surfaces.

2.5 EDGE BANDING

- A. Edge banding for casework doors and drawer fronts shall be PVC vinyl and shall be 0.125 inch thick.
- B. Material width shall be 15/16 inches or as indicated on the drawings.
- C. Color and pattern shall match exposed door and drawer front laminate pattern and color.

2.6 CABINET HARDWARE

- A. Submit one sample of each cabinet hardware item specified to include hinges, pulls, and drawer glides.

- B. All hardware shall conform to ANSI/BHMA A156.9, unless otherwise noted, and shall consist of the following components:
 - 1. Door Hinges.
 - a. Concealed type as indicated on the drawings.
 - 2. Cabinet Pulls.
 - a. Wire type.
 - 3. Drawer Slide.
 - a. Side mounted type, with full extension and a minimum 100 pound load capacity.
 - b. Slides shall include an integral or positive stop to avoid accidental drawer removal.
 - 4. Adjustable Shelf Support System.
 - a. Recessed mortised metal standards, BHMA No. BO4071, finish.
 - b. Support clips for the standards shall be open type, BHMA No. B04091, or closed type, BHMA No. B04081, finished with multiple holes with metal, plastic, or wood pin supports.

2.8 FASTENERS

- A. Nails, screws, and other suitable fasteners shall be the size and type best suited for the purpose and shall conform to ASTM F547 where applicable.

2.9 ADHESIVES, CAULKS, AND SEALANTS

- A. Adhesives:
 - 1. Adhesives shall be of a formula and type recommended by AWI.
 - 2. Adhesives shall be selected for their ability to provide a durable, permanent bond and shall take into consideration such factors as materials to be bonded, expansion and contraction, bond strength, fire rating, and moisture resistance.
- B. Wood Joinery:
 - 1. Adhesives used to bond wood members shall be a Type II for interior use urea-formaldehyde resin formula or polyvinyl acetate resin emulsion.
 - 2. Adhesives shall withstand a bond test as described in ANSI/WDMA I.S.1A.
- C. Laminate Adhesive:
 - 1. Adhesive used to join high-pressure decorative laminate to wood shall be a water-based contact adhesive consistent with AWI and laminate manufacturer's recommendations.
 - 2. PVC edge banding shall be adhered using a polymer-based hot melt glue.
- D. Caulk:
 - 1. Caulk used to fill voids and joints between laminated components and between laminated components and adjacent surfaces shall be clear, 100 percent silicone.
- E. Sealant:
 - 1. Sealant shall be of a type and composition recommended by the substrate manufacturer to provide a moisture barrier at sink cutouts and all other locations where unfinished substrate edges may be subjected to moisture.

2.10 FABRICATION

- A. Verify field measurements as indicated in the shop drawings before fabrication.
- B. Fabrication and assembly of components shall be accomplished at the shop site to the maximum

extent possible.

- C. Construction and fabrication of cabinets and their components shall meet or exceed the requirements for AWI premium or custom grade unless otherwise indicated in this specification.
- D. Cabinet style, in accordance with AWI AWS, Section 400-G descriptions, shall be flush overlay or as indicated on the drawings.
- E. Base and Wall Cabinet Case Body.
 - 1. Cabinet Components:
 - a. Frame members shall be glued-together, kiln-dried hardwood lumber.
 - b. Top corners, bottom corners, and cabinet bottoms shall be braced with either hardwood blocks or water-resistant glue and nailed in place metal or plastic corner braces.
 - 2. Body Members (Ends, Divisions, Bottoms, and Tops):
 - a. 3/4 inch particleboard.
 - 3. Face Frames and Rails:
 - a. 3/4 inch hardwood lumber.
 - 4. Shelving:
 - a. 3/4 inch particleboard.
 - 5. Cabinet Backs:
 - a. 1/4 inch particleboard.
 - 6. Drawer Sides, Backs, and Subfronts:
 - a. 1/2 inch hardwood lumber.
 - 7. Drawer Bottoms:
 - a. 1/4 inch particleboard.
 - 8. Door and Drawer Fronts:
 - a. 3/4-inch particleboard.
- F. Joinery Method for Case Body Members.
 - 1. Tops, Exposed Ends, and Bottoms:
 - a. Steel "European" assembly screws 1-1/2 inch from end, 5 inch on center (fasteners will not be visible on exposed parts).
 - b. Doweled, glued under pressure (approx. 4 dowels per 12 inches of joint).
 - c. Stop dado, glued under pressure, and either nailed, stapled or screwed (fasteners will not be visible on exposed parts).
 - d. Spline or biscuit, glued under pressure.
 - e. Exposed End Corner and Face Frame Attachment.
 - 2. Mitered Joint:
 - a. Lock miter or spline or biscuit, glued under pressure (no visible fasteners).
 - 3. Non-Mitered Joint (90 degree):
 - a. Butt joint glued under pressure (no visible fasteners).
 - 4. Butt Joint glued and nailed.
- G. Cabinet Backs (Wall Hung Cabinets):

1. Wall hung cabinet backs must not be relied upon to support the full weight of the cabinet and its anticipated load for hanging/mounting purposes.
2. Method of back joinery and hanging/mounting mechanisms should transfer the load to case body members.
3. Fabrication method shall be:
 - a. Full bound, captured in grooves on cabinet sides, top, and bottom. Cabinet backs for floor standing cabinets shall be side bound, captured in grooves; glued and fastened to top and bottom.
 - b. Full overlay, plant-on backs with minimum back thickness of 1/2 inch and minimum No. 12 plated (no case hardened) screws spaced a minimum 3 inches on center. Edge of back shall not be exposed on finished sides. Anchor strips are not required when so attached.
 - c. Side bound, captured in groove or rabbets; glued and fastened.

H. Cabinet Backs (Floor Standing Cabinets):

1. Fabrication methods shall be:
 - a. Side bound, captured in grooves; glued and fastened to top and bottom.
 - b. Full overlay, plant-on backs with minimum back thickness of 1/2 inch and minimum No. 12 plated (no case hardened) screws spaced a minimum 3 inches on center. Edge of back shall not be exposed on finished sides. Anchor strips are not required when so attached.
 - c. Side bound, placed in rabbets; glued and fastened in rabbets.
2. Wall Anchor Strips:
 - a. Wall Anchor Strips shall be required for all cabinets with backs less than 1/2 inch thick.
 - b. strips shall consist of minimum 1/2 inch thick lumber, minimum 2-1/2 inches width; securely attached to wall side of cabinet back - top and bottom for wall hung cabinets, top only for floor standing cabinets.
3. Cabinet Floor Base:
 - a. Floor cabinets shall be mounted on a base constructed of nominal 2 inch thick lumber.
 - b. Base assembly components shall be treated lumber. Finished height for each cabinet base shall be as indicated on the drawings.
 - c. Bottom edge of the cabinet door or drawer face shall be as indicated on the drawings.
4. Cabinet Door and Drawer Fronts:
 - a. Door and drawer fronts shall be fabricated from 3/4 inch medium density particleboard.
 - b. All door and drawer front edges shall be surfaced with [high pressure PVC edge banding, color and pattern to match exterior face laminate.
5. Drawer Components:
 - a. Drawer components shall consist of a removable drawer front, sides, backs, and bottom.
 - b. Drawer components shall be constructed of the following materials and thicknesses:
6. Drawer Sides and Backs For Laminate Finish:
 - a. 1/2 inch thick 7-ply hardwood veneer core substrate.
7. Drawer Sides and Back For Thermoset Decorative Overlay (Melamine) Finish:
 - a. 1/2 inch thick medium density particleboard or MDF fiberboard substrate.
8. Drawer Bottom:
 - a. 1/4 inch thick veneer core panel product for thermoset decorative overlay melamine finish.

I. Drawer Assembly Joinery Method:

1. Multiple dovetail (all corners) or French dovetail front/dadoed back, glued under pressure.
2. Doweled, glued under pressure.
3. Lock shoulder, glued and pin nailed.
4. Bottoms shall be set into sides, front, and back, 1/4 inch deep groove with a minimum 3/8 inch standing shoulder.

J. Shelving:

1. General Requirements.

- a. Shelving shall be fabricated from 3/4 inch medium density particleboard.
- b. All shelving top and bottom surfaces shall be finished with thermoset decorative overlay (melamine).
- c. Shelf edges shall be finished in with thermoset decorative overlay (melamine).

2. Shelf Support System:

- a. Recessed (Mortised) Metal Shelf Standards.
- b. Mortise standards flush with the finishes surface of the cabinet interior side walls, two per side. Position and space standards on the side walls to provide a stable shelf surface that eliminates tipping when shelf front is weighted. Install and adjust standards vertically to provide a level, stable shelf surface when clips are in place.
- c. Pin Hole Method:
 - Drill holes on the interior surface of the cabinet side walls.
 - Evenly space holes in two vertical columns.
 - Drill holes to provide a level, stable surface when the shelf is resting on the shelf pins.
 - Coordinate hole diameter with pin insert size to provide a firm, tight fit.

K. Laminate Clad Countertops:

1. Construct laminate countertop substrate of 3/4 inch particleboard or as otherwise indicated in the drawings.
2. The substrate shall be moisture-resistant where countertops receive sinks, lavatories, or are subjected to liquids.
3. All substrates shall have sink cutout edges sealed with appropriate sealant against moisture. No joints shall occur at any cutouts.
4. A balanced backer sheet is required.

L. Edge Style:

1. Front countertop edges shall be in shapes and to dimensions as shown on the drawings.
2. The countertop edge material shall be:
 - a. Post Formed Plastic Laminate
 - b. Laminate edge shall be integral with countertop surface. Shape and profile shall be Square or as otherwise indicated on the drawings.

M. Plastic Laminate Self Edge:

1. Flat, 90 degree "self " edge.
2. Edge must be applied before top.
3. Laminate edge shall overlap countertop laminate and shall be eased to eliminate sharp

corners.

N. Laminate Clad Splashes:

1. Countertop splash substrate shall be 3/4 inch particleboard.
2. Laminate clad backsplash shall be loose, to be installed at the time of countertop installation.
3. Side splashes shall be straight profile and provided loose, to be installed at the time of countertop installation. Back and side splash laminate pattern and color shall match the adjacent countertop laminate.

O. Laminate Application:

1. Laminate application to substrates shall follow the recommended procedures and instructions of the laminate manufacturer and ANSI/NEMA LD 3, using tools and devices specifically designed for laminate fabrication and application.
2. Provide a balanced backer sheet (Grade BK) wherever only one surface of the component substrate requires a plastic laminate finish.
3. Apply required grade of laminate in full uninterrupted sheets consistent with manufactured sizes using one piece for full length only, using adhesives specified herein or as recommended by the manufacturer.
4. Fit corners and joints hairline.
5. All laminate edges shall be machined flush, filed, sanded, or buffed to remove machine marks and eased (sharp corners removed).
6. Clean up at easing shall be such that no overlap of the member eased is visible.
7. Fabrication shall conform to ANSI A161.2.
8. Laminate types and grades for component surfaces shall be as follows unless otherwise indicated on the drawings.

P. Base/Wall Cabinet Case Body:

1. Exterior (exposed) surfaces to include exposed and semi-exposed face frame surfaces: HPDL Grade VGS.
2. Interior (semi-exposed) surfaces to include interior back wall, bottom, and side walls: Thermoset Decorative Overlay (melamine).

Q. Adjustable Shelving:

1. Top and Bottom Surfaces: Thermoset Decorative Overlay (melamine).
2. All Edges: Thermoset Decorative Overlay (melamine).

R. Fixed Shelving

1. Top and Bottom Surfaces: Thermoset Decorative Overlay (melamine).
2. Exposed Edges: Thermoset Decorative Overlay (melamine).
3. Door, Drawer Fronts, Access Panels:
 - a. Exterior (Exposed) and Interior (Semi-Exposed) Faces HPDL Grade VGS.
 - b. Edges, PVC edgebanding.

S. Drawer Assembly: All interior and exterior surfaces: Thermoset Decorative Overlay (melamine).

T. Countertops and Splashes: All exposed and semi-exposed surfaces: HPDL Grade HGS

U. Tolerances: Flushness, flatness, and joint tolerances of laminated surfaces shall meet the AWI AWS premium grade requirements.

V. Finishing:

1. Filling
 - a. No fasteners shall be exposed on laminated surfaces.
 - b. All nails, screws, and other fasteners in non-laminated cabinet components shall be countersunk and the holes filled with wood filler consistent in color with the wood species.
2. Sanding:
 - a. All surfaces requiring coatings shall be prepared by sanding with a grit and in a manner that scratches will not show in the final system.
3. Coatings:
 - a. Types, method of application and location of casework finishes shall be in accordance with the finish schedule, drawings and Section 09 90 00 PAINTS AND COATINGS.
 - b. All cabinet reveals shall be painted.
 - c. Submit descriptive data which provides narrative written verification of all types of construction materials and finishes, methods of construction, etc. not clearly illustrated on the submitted shop drawings.
 - d. Data shall provide written verification of conformance with AWI AWS for the quality indicated to include materials, tolerances, and types of construction.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Installation shall comply with applicable requirements for AWI AWS [premium] [custom] quality standards.
- B. Countertops and fabricated assemblies shall be installed level, plumb, and true to line, in locations shown on the drawings.
- C. Cabinets and other laminate clad casework assemblies shall be attached and anchored securely to the floor and walls with mechanical fasteners that are appropriate for the wall and floor construction.

3.2 ANCHORING SYSTEMS

- A. Floor
 1. Utilize a floor anchoring system as detailed on the drawings.
 2. Anchoring and mechanical fasteners shall not be visible from the finished side of the casework assembly.
 3. Cabinet assemblies shall be attached to anchored bases without visible fasteners [as indicated in the drawings].
 4. Where assembly abuts a wall surface, anchoring shall include a minimum 1/2 inch thick lumber or panel product hanging strip, minimum 2-1/2 inch width; securely attached to the top of the wall side of the cabinet back.
- B. Wall
 1. Utilize minimum 1/2 inch thick lumber or panel product hanging strips, minimum 2-1/2 inch width; securely attached to the wall side of the cabinet back, both top and bottom.
- C. Countertops
 1. Countertops shall be installed in locations as indicated on the drawings. Countertops shall be fastened to supporting casework structure with mechanical fasteners, hidden from view.
 2. All joints formed by the countertop or countertop splash and adjacent wall surfaces shall be filled

with a clear silicone caulk.

3. Loose back and side splashes shall be adhered to both the countertop surface perimeter and the adjacent wall surface with adhesives appropriate for the type of materials to be adhered.
4. Joints between the countertop surface and splash shall be filled with clear silicone caulk in a smooth consistent concave bead.
5. Bead size shall be the minimum necessary to fill the joint and any surrounding voids or cracks.

D. Hardware

1. Casework hardware shall be installed in types and locations as indicated on the drawings.
2. Where fully concealed European-style hinges are specified to be used with particleboard or fiberboard doors, the use of plastic or synthetic insertion dowels shall be used to receive 3/16 inch "Euro screws".
3. The use of wood screws without insertion dowels is prohibited.

E. Doors, Drawers and Removable Panels

1. The fitting of doors, drawers and removable panels shall be accomplished within target fitting tolerances for gaps and flushness in accordance with AWI AWS premium grade requirements.

F. Plumbing Fixtures

1. Install sinks, sink hardware, and other plumbing fixtures in locations as indicated on the drawings and in accordance with applicable PLUMBING specification sections.

END OF SECTION 06 41 13

SECTION 07 21 13 THERMAL AND ACOUSTICAL INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies thermal and acoustical insulation for buildings.

1.2 SUBMITTALS:

- A. Submit in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.
- B. Manufacturer's Literature and Data:
 - 1. Insulation, each type used.
 - 2. Adhesive, each type used.
 - 3. Tape.
- C. Certificates: Stating the type, thickness and "R" value (thermal resistance) of the insulation to be installed.

1.3 STORAGE AND HANDLING:

- A. Store insulation materials in weathertight enclosure.
- B. Protect insulation from damage from handling, weather and construction operations before, during, and after installation.

1.4 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - C553-08Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
 - C578-10Rigid, Cellular Polystyrene Thermal Insulation
 - C591-09Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
 - E84-10.....Surface Burning Characteristics of Building Materials
 - F1667-11Driven Fasteners: Nails, Spikes and Staples.

PART 2 - PRODUCTS

2.1 INSULATION – GENERAL:

- A. Where thermal resistance ("R" value) is specified or shown for insulation, the thickness shown on the drawings is nominal. Use only insulation with actual thickness that is not less than that required to provide the thermal resistance specified.
- B. Where "R" value is not specified for insulation, use the thickness shown on the drawings.
- C. Where more than one type of insulation is specified, the type of insulation for each use is optional, except use only one type of insulation in any particular area.
- D. Insulation Products shall comply with following minimum content standards for recovered materials.
- E. Underside of roof deck shall be sprayed with open cell spray foam insulation, R value as indicated on the plans.
- F. Walls and underside of floor (between floor joist) shall be sprayed with closed cell spray foam insulation, R value as indicated on the plans.

2.3 PERIMETER INSULATION IN CONTACT WITH SOIL:

- A. Polystyrene Board: ASTM C578, Type IX.

2.4 EXTERIOR FRAMING OR FURRING INSULATION:

- A. Batt or Blanket: Optional.
- B. Mineral Fiber: ASTM C665, Type II, Class C, Category I where framing is faced with gypsum board.
- C. Mineral Fiber: ASTM C665, Type III, Class A where framing is not faced with gypsum board.

2.7 RIGID INSULATION:

- A. On the inside face of exterior walls, spandrel beams, floors, bottom of slabs, and where shown.
- B. Mineral Fiber Board: ASTM C612, Type IB or 2.
- C. Cellular Glass Block: ASTM C552, Type I.

2.9 FASTENERS:

- A. Staples or Nails: ASTM F1667, zinc-coated, size and type best suited for purpose.
- B. Screws: ASTM C954 or C1002, size and length best suited for purpose with washer not less than 50 mm (two inches) in diameter.
- C. Impaling Pins: Steel pins with head not less than 50 mm (two inches) in diameter with adhesive for anchorage to substrate. Provide impaling pins of length to extend beyond insulation and retain cap washer when washer is placed on the pin.

2.10 ADHESIVE:

- A. As recommended by the manufacturer of the insulation.
- B. Asphalt: ASTM D312, Type III or IV.
- C. Mortar: ASTM C270, Type 0.

2.11 TAPE:

- A. Pressure sensitive adhesive on one face.
- B. Perm rating of not more than 0.50.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

- A. Install insulation with the vapor barrier facing the heated side, unless specified otherwise.
- B. Install rigid insulating units with joints close and flush, in regular courses and with cross joints broken.
- C. Install batt or blanket insulation with tight joints and filling framing void completely. Seal cuts, tears, and unlapped joints with tape.
- D. Fit insulation tight against adjoining construction and penetrations, unless specified otherwise.

3.3 PERIMETER INSULATION:

- A. Vertical insulation:
 - 1. Fill joints of insulation with same material used for bonding.
 - 2. Bond polystyrene board to surfaces with adhesive or Portland cement mortar mixed and applied in accordance with recommendations of insulation manufacturer.
 - 3. Bond cellular glass insulation to surfaces with hot asphalt or adhesive cement.
- B. Horizontal insulation under concrete floor slab:
 - 1. Lay insulation boards and blocks horizontally on level, compacted and drained fill.
 - 2. Extend insulation from foundation walls towards center of building not less than 600 mm (24 inches) or as shown.

3.4 EXTERIOR FRAMING OR FURRING BLANKET INSULATION:

- A. Pack insulation around door frames and windows and in building expansion joints, door soffits and other voids. Pack behind outlets around pipes, ducts, and services encased in walls. Open voids are not permitted. Hold insulation in place with pressure sensitive tape.
- B. Lap vapor retarder flanges together over face of framing for continuous surface. Seal all penetrations through the insulation.

- C. Fasten blanket insulation between metal studs or framing and exterior wall furring by continuous pressure sensitive tape along flanged edges.
- D. Fasten blanket insulation between wood studs or framing with nails or staples through flanged edges on face of stud. Space fastenings not more than 150 mm (six inches) apart.
- E. Roof Insulation: Place mineral fiber blankets between framing to provide not less than a 50 mm (two inch) air space between insulation and roof sheathing or subfloor.

END OF SECTION 07 21 13

SECTION 07 26 00 MOISTURE AND AIR (VAPOR) BARRIERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Moisture and air barriers installed on sheathing in brick cavity wall construction.
- B. Seam Tape.
- C. Associated Fasteners.
- D. Provide all necessary materials, parts, pieces, components, etc. to provide a complete and functional system. Include necessary labor and materials to assure system performance at door and window openings, louvers, pipe penetrations, etc.

1.2 RELATED WORK:

- A. Flashing in brick veneer cavity walls: Section 07 60 00, FLASHING AND SHEET METALS.

1.3 REFERENCES

- A. ASTM International
 - 1. ASTM C 920; Standard Specification for Elastomeric Joint Sealants
 - 2. ASTM C 1193; Standard Guide for Use of Joint Sealants
 - 3. ASTM D 882; Test Method for Tensile Properties of Thin Plastic Sheeting
 - 4. ASTM D 1117; Standard Guide for Evaluating Non-woven Fabrics
 - 5. ASTM E 84; Test Method for Surface Burning Characteristics of Building Materials
 - 6. ASTM E 96; Test Method for Water Vapor Transmission of Materials
 - 7. ASTM E 2178; Test Method for Air Permeance of Building Materials
- B. AATCC – American Association of Textile Chemists & Colorists
 - 1. Test Method 127 Water Resistance: Hydrostatic Pressure Test
- C. TAPPI
 - 1. Test Method T-410; Grams of Paper and Paperboard (Weight per Unit Area)
 - 2. Test Method T-460; Air Resistance of Paper (Gurley Hill Method)

1.4 SUBMITTALS

- A. Refer to Section 01 33 00, SHOP DRAWINGS, PRODUCT DATA AND SUBMITTALS.
- B. Product Data: Submit manufacturer current technical literature for each component.
- C. Samples: Moisture and air barrier Membrane, minimum 8-1/2 inches by 11 inch.
- D. Quality Assurance Submittals
 - 1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.
 - 2. Manufacturer Instructions: Provide manufacturer's written installation instructions.

3. Manufacturer's Field Service Reports: Provide site reports from authorized field service representative, indicating observation of moisture and air barrier assembly installation.
- E. Manufacturer's Warranty: Provide sample warranty and (at Closeout) Manufacturer's executed warranty form with authorized signatures and endorsements indicating date of moisture and air barrier purchase.

1.5 QUALITY ASSURANCE

- A. Qualifications
1. Installer shall have experience with installation of specified products. Minimum of ten (10) similar projects.
 2. Installation shall be in accordance with manufacturer's installation guidelines and recommendations.
 3. Source Limitations: Provide products produced by single manufacturer.
- B. Mock-up
1. Assembly including fasteners, flashing, tape and related accessories per manufacturer's current printed instructions and recommendations.
 - a. Include Vapor and Moisture Barrier in brick veneer cavity wall mock-up.
 2. Have manufacturer's designated representative perform inspection of mock-up and provide written confirmation that mock-up complies with all installation requirements and warranty requirements.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Store all materials as recommended by the manufacturer.

1.7 WARRANTY

- A. Manufacturer's Warranty
1. Ten (10) years from date of purchase.
 2. Conduct pre-installation meetings and jobsite observations as required by manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Basis of Design: spunbonded polyolefin, non-woven, non-perforated, Moisture and Air Barrier equal to Dupont, Tyvek, ThermaWrap LE, including all related components.
- B. Performance Characteristics:
1. Effective R-value: R-2 (including $\frac{3}{4}$ " minimum airspace), as designated on ASHRAE tables, ASTM Handbook of Fundamentals, Chapter 25- Table 3.
 2. Air Penetration: 0.002 cfm/ft² at 1.57 psf, when tested in accordance with ASTM E 2178.
 3. Water Vapor Transmission: 68 perms, when tested in accordance with ASTM E 96, Method B.

4. Water Penetration Resistance: 210 cm when tested in accordance with AATCC Test Method 127.
5. Basis Weight: 2.5 oz/yd², when tested in accordance with TAPPI Test Method T-410.
6. Air Resistance: Air infiltration at >1000 seconds, when tested in accordance with TAPPI Test Method T-460.
7. Tensile Strength: 29/27 lbs/in., when tested in accordance with ASTM D 882, Method A.
8. Tear Resistance: 12/7 lbs., when tested in accordance with ASTM D 1117.
9. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E 84. Flame Spread: 10, Smoke Developed: 40.

2.2 ACCESSORIES

- A. Seam Tape: Manufacturer's standard seam tape equal to DuPont, Tyvek, Metallized Tape or DuPont, Tyvek Tape. Provide seam tape specifically manufactured by the moisture and air barrier manufacturer for the installed barrier product.
- B. Fasteners:
 1. Steel Frame Construction: Manufacturer's standard 1-5/8 inch rust resistant screw with 2-inch diameter plastic cap fasteners.
 2. Masonry Construction: Manufacturer's standard masonry tap-con fasteners with 2-inch diameter plastic cap fasteners.
- C. Sealants
 1. Provide sealants that comply with ASTM C 920, elastomeric polymer sealant to maintain watertight conditions.
 2. Provide sealants recommended by the moisture and air barrier manufacturer.
- D. Adhesives:
 1. Provide adhesive recommended by the moisture and air barrier manufacturer.
- E. Primers:
 1. Provide manufacturer's recommended primer to assist in adhesion between substrate and adhesives and sealants.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify substrate and surface conditions are in accordance with moisture and air barrier manufacturer recommended tolerances prior to installation of moisture and air barrier and accessories.

3.2 INSTALLATION - MOISTURE AND AIR BARRIER

- A. Install moisture and air barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations
- B. Install moisture and air barrier prior to installation of windows and doors.
- C. Start moisture and air barrier installation at a building corner, leaving 6-12 inches of moisture and air barrier extended beyond corner to overlap.

- D. Install moisture and air barrier silver side facing air space.
- E. Install moisture and air barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain moisture and air barrier plumb and level
- F. Sill Plate Interface: Extend lower edge of moisture and air barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by moisture and air barrier manufacturer.
- G. Window and Door Openings: Extend moisture and air barrier completely over openings.
- H. Overlap moisture and air barrier
 - 1. Exterior corners: minimum 12 inches.
 - 2. Seams: minimum 6 inches.
- I. Moisture and air barrier Attachment:
 - 1. Attach moisture and air barrier to studs through exterior sheathing. Secure using moisture and air barrier manufacturer recommend fasteners, space 6 -18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.
- J. Apply 4 inch by 7 inch piece of moisture and air barrier manufacturer approved alternate to moisture and air barrier membrane prior to the installation cladding anchors.

3.3 SEAMING

- A. Seal seams of moisture and air barrier with seam tape at all vertical and horizontal overlapping seams.
- B. Seal any tears or cuts as recommended by moisture and air barrier manufacturer.

3.4 OPENING PREPARATION

- A. Cut moisture and air barrier in an "I-cut" pattern. A modified "I-cut" is also acceptable.
 - 1. Cut moisture and air barrier horizontally along the bottom and top of window opening.
 - 2. From top center of the window opening, cut moisture and air barrier vertically down to sill.
 - 3. Fold side and bottom moisture and air barrier flaps into window opening and fasten.
- B. Cut a head flap at 45-degree angle in the moisture and air barrier at window head to expose 8 inches of sheathing. Temporarily secure moisture and air barrier flap away from sheathing with tape.

3.5 FIELD QUALITY CONTROL

- A. Notify manufacturer's designated representative to obtain [required] periodic observations of moisture and air barrier assembly installation.

3.6 PROTECTION

- A. Protect installed moisture and air barrier from damage.

END OF SECTION 07 26 00

SECTION 07 41 13 STANDING SEAM METAL ROOF

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. Preformed, prefinished metal roofing and flashing.
- B. Miscellaneous trim, flashing, closures, drip flashing, and accessories.
- C. Sealant.
- D. Fastening devices.

1.2 RELATED WORK:

- A. Section 06 10 00: Rough Carpentry.
- B. Section 07 92 00: Joint Sealants.

1.3 REFERENCES

- A. American Iron & Steel Institute (AISI) Specification for the Design of Cold formed Steel Structural Members.
- B. ASTM A-653-09 Steel Sheet, Zinc-Coated (Galvanized)
- C. ASTM 792-86 AZ-50 Aluminum Zinc Alloy Coated Steel (Galvalume Sheet Metal
- D. ASTM E-1680
- E. ASTM E-1646
- F. ASTM E-1592
- G. Spec Data Sheet - Aluminum Zinc Alloy Coated Steel (Galvalume) Sheet Metal by Bethlehem Corp.
- H. SMACNA - Architectural Sheet Metal Manual.
- I. Building Materials Directory - Underwriter's Laboratories, Test Procedure 580 - UL-90.

1.5 SUBMITTALS

- A. Submit detailed shop drawings showing layout of panels, anchoring details, joint details, trim, flashing, and accessories. Show details of weatherproofing, terminations, and penetrations.
- B. Submit a sample of each type of roof panel, complete with factory finish.
- C. Submit results indicating compliance with minimum requirements of the following performance tests:
 - 1. Air Infiltration - ASTM E 1680
 - 2. Water Infiltration - ASTM E 1646
 - 3. Wind Uplift - UL 90
- D. Submit calculations with registered engineer seal, verifying roof panel and attachment method resist wind pressures imposed on it pursuant to applicable building codes.

1.6 QUALITY ASSURANCE:

- A. Manufacturer: Company specializing in Architectural Sheet Metal Products with ten (10) years minimum experience.

- B. Specified manufacturer and product is the basis of design. Products of other manufacturers are acceptable provided that they comply with this specification in its entirety.

1.7 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 allowing 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 adequate ventilation.

1.8 WARRANTY

- A. Paint finish shall have a twenty-year warranty against cracking, peeling and fading (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. Roofing Installer shall furnish guarantee covering watertightness of the roofing system for the period of two (2) years from the date of substantial completion.
- D. Roofing Installer to furnish, Manufacturer's standard watertightness warranty; Roofing Installer to comply with Manufacturer's watertightness warranty program and submit to manufacture all required documents. Watertightness warranty program to include roofing installation inspections which Roofing Installer shall participate.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Basis of Design: Berridge Manufacturing Company, San Antonio, Texas.
- B. Products of other manufacturers shall fully comply with specified requirements.

2.2 SHEET MATERIALS

- A. Prefinished metal shall be Aluminum-Zinc Alloy Coated (AZ-50 Galvalume) Steel Sheet, 22-Gauge, ASTM 792-08, Grade 40, yield strength 40 ksi min.
- B. Finish shall be full strength Kynar 500 coating applied by the manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.75 ± 0.05 mil over 0.20 ± 0.05 mil prime coat, to provide a total top side dry film thickness of 0.95 ± 0.10 mil. Bottom side shall be coated with a primer (non-metallics only) and beige urethane coating with a total dry film thickness of 0.35 ± 0.05 mil. Finish shall conform to all tests for adhesion, flexibility, and longevity as specified by the Kynar 500 finish supplier.
 - 1. Color to be selected from manufacturer's standard line. All exposed/visible components to be the same color.
- C. Strippable film shall be applied to the top side of all prefinished metal to protect the finish during fabrication, shipping and field handling. This strippable film MUST be removed immediately before installation.
- D. Unpainted metal shall be Aluminum-Zinc Alloy Coated (AZ-55 Acrylic Coated Galvalume) Steel Sheet, 22-Gauge, ASTM 792-08, Grade 40, yield strength 40 ksi min. with clear acrylic coating on both sides of material.
- E. Field protection must be provided by the contractor at the job site so stacked or coiled material is not exposed to weather and moisture.

- F. 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.

2.3 ACCESSORY MATERIALS

- A. Fasteners: Galvanized Steel with washers at exposed fasteners where approved by architect.
- B. Sealant: Sealant shall be an ultra-low modulus, high performance, one-part, moisture curing silicone joint sealant as recommended by the roofing manufacturer (Do not use a clear sealant or sealants which release a solvent or acid during curing).
- C. Sealant must be resistant to environmental conditions such as wind loading, wind driven rain, snow, sleet, acid rain, ozone, ultraviolet light and extreme temperature variations.
- D. Features must include joint movement capabilities of +100% & -50% ASTM C-719, capable of taking expansion, compression, transverse and longitudinal movement, service temperature range -65°F to 300°F (-54°C to 149°C), Flow, sag or slump: ASTM C-639; Nil, Hardness (Shore A): ASTM C-661; 15, Tensile strength at maximum elongation: ASTM D-412; 200 psi, Tensile strength at 100% elongation: ASTM D-412; 35 psi, Tear strength, (die "C"); ASTM D-624; 40 pli, Peel strength (Aluminum, Glass, Concrete): ASTM C-794; 30 pli.
- E. Vinyl Weatherseal Insert.

2.4 FABRICATION

- A. All exposed adjacent flashing shall be of the same material and finish as the roof panels.
- B. Hem all exposed edges of flashing on underside, ½ inch.
- C. Panels shall have 12 ¾" on-center seam spacing with a seam height of 1" and shall have no exposed fasteners.
- D. Panels shall be factory fabricated.
- E. Snap-on seams shall be 1" in height and shall contain the manufacturer's factory-applied weather seal insert to prevent siphoning of moisture through the standing seam.
- F. Concealed anchor clips shall be spaced as required to meet uplift loads (maximum of 24" on center).

PART 3 EXECUTION

3.1 INSPECTION:

- A. Substrate
1. Examine plywood deck to ensure proper attachment to framing.
 2. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves or projections, level to ¼" in 20' and properly sloped to valleys and eaves.
 3. Verify roof openings, curbs, pipes, sleeves, ducts or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.
 4. Verify deck is dry and free of snow or ice and that joints in wood deck are solidly supported and nailed.
- B. Underlayment:
1. Verify #30 unperforated asphalt saturated roofing felt underlayment has been installed over solid plywood or OSB sheathing and fastened in place and that ice and water shield has been installed as detailed in the drawings.

2. Ice & Water Shield underlayment to be used on all curved applications and on low (less than 1:12) slope or complex roofs per Berridge recommendation.
3. Ensure felt installed horizontally, starting at eave to ridge with a 6" minimum overlap and 18" endlaps.
4. Ensure that all nail heads and felt caps are totally flush with the substrate. Fasteners shall be galvanized roofing nails or zinc-coated fasteners.
5. Verify that underlayment and fasteners comply with roofing manufacturer's warranty requirements.

3.2 INSTALLATION:

- A. 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.
- B. Install panels in such a manner that horizontal lines are true and level and vertical lines are plumb.
- C. Install starter and edge trim before installing roof panels.
- D. Remove protective strippable film prior to installation of roof panels.
- E. Attach panels using manufacturer's standard clips and fasteners, spaced in accordance with approved shop drawings.
- F. Install sealants for preformed roofing panels as approved on shop drawings.
- G. Do not allow panels or trim to come into contact with dissimilar materials.
- H. Do not allow traffic on completed roof. If required, provide cushioned walk boards.
- I. Protect installed roof panels and trim from damage caused by adjacent construction until completion of installation.
- J. Remove and replace any panels or components which are damaged beyond successful repair.

3.03 CLEANING

- A. Clean any grease, finger marks or stains from the panels per manufacturer's recommendations.
- B. Remove all scrap and construction debris from the site.

END OF SECTION 07 41 13

SECTION 07 53 23 ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Ethylene Propylene Diene Monomer (EPDM) sheet roofing fully adhered to rigid insulation system anchored to metal roof deck.
 - 2. EPDM roofing is limited to tie-in of existing membrane roof to new addition.

1.2 RELATED REQUIREMENTS

- A. Not Used

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American National Standards Institute/Single-Ply Roofing Institute (ANSI/SPRI):
 - 1. FX-1-01(R2006) - Standard Field Test Procedure for Determining the Withdrawal Resistance of Roofing Fasteners.
 - 2. RP-4 2013 - Wind Design Standard for Ballasted Single-ply Roofing Systems.
- C. American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI):
 - 1. 7-10 - Minimum Design Loads For Buildings and Other Structures.
- D. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE):
 - 1. 90.1-13 - Energy Standard for Buildings Except Low-Rise Residential Buildings.
- E. ASTM International (ASTM):
 - 1. C1371-15 - Determination of Emittance of Materials Near Room Temperature Using Portable Emisometers.
 - 2. C1549-09(2014) - Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
 - 3. D751-06(2011) - Coated Fabrics.
 - 4. D1248-12 - Polyethylene Plastics Extrusion Materials for Wire and Cable.
 - 5. D1876-08(2015)e1 - Peel Resistance of Adhesives (T-Peel Test).
 - 6. D2103-15 - Polyethylene Film and Sheeting.
 - 7. D2240-05(2010) - Rubber Property-Durometer Hardness.
 - 8. D3884-09(2013)e1 - Abrasion Resistance of Textile Fabrics (Rotary Platform, Double-Head Method).
 - 9. D4263-83(2012) - Indicating Moisture in Concrete by the Plastic Sheet Method.
 - 10. D4586/D4586M-07(2012)e1 - Asphalt Roof Cement, Asbestos-Free.
 - 11. D4637/D4637M-14e1 - EPDM Sheet Used In Single-Ply Roof Membrane.
 - 12. E96/E96M-15 - Water Vapor Transmission of Materials.
 - 13. E408-99(2015) - Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.

14. E1918-06(2015) - Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
 15. E1980-11 - Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field.
 16. G21-15 - Resistance of Synthetic Polymeric Materials to Fungi.
- F. National Roofing Contractors Association (NRCA):
1. Manual-15 - The NRCA Roofing Manual: Membrane Roof Systems.
- G. UL LLC (UL):
1. 580-06 - Tests for Uplift Resistance of Roof Assemblies.
 2. 1897-15 - Uplift Tests for Roof Covering Systems.

1.4 PRE-INSTALLATION MEETINGS

- A. Conduct pre-installation meeting at the Project site minimum 30 days before beginning Work of this section.
1. Required Participants:
 - a. Architect.
 - b. Owner's Representative.
 - c. Inspection and Testing Agency.
 - d. Contractor.
 - e. Installer.
 - f. Manufacturer's field representative.
 - g. Other installers responsible for adjacent and intersecting work, including roof deck, flashings, roof specialties, roof accessories, utility penetrations, rooftop curbs and equipment, lightning protection, etc.
 2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
 - a. Installation schedule.
 - b. Installation sequence.
 - c. Preparatory work.
 - d. Protection before, during, and after installation.
 - e. Installation.
 - f. Terminations.
 - g. Transitions and connections to other work.
 - h. Inspecting and testing.
 - i. Other items affecting successful completion.
 - j. Pull out test of fasteners.
 - k. Material storage, including roof deck load limitations.
 3. Document and distribute meeting minutes to participants to record decisions affecting installation.

1.5 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:

1. Roofing membrane layout.
 2. Roofing membrane fastener pattern and spacing.
 3. Roofing membrane seaming and joint details.
 4. Roof membrane penetration details.
 5. Base flashing and termination details.
- C. Manufacturer's Literature and Data:
1. Description of each product.
 2. Minimum fastener pull out resistance.
 3. Installation instructions.
 4. Warranty.
- D. Samples:
1. Roofing Membrane: 6 inch square.
 2. Base Flashing: 6 inch square.
 3. Fasteners: Each type.
 4. Roofing Membrane Seam: 12 inches square.
- E. Certificates: Certify products comply with specifications.
1. Fire and windstorm classification.
 2. High wind zone design requirements.
 3. Energy performance requirements.
- F. Qualifications: Substantiate qualifications comply with specifications.
1. Installer, including supervisors with project experience list.
 2. Manufacturer's field representative with project experience list.
- G. Field quality control reports.
- H. Temporary protection plan. Include list of proposed temporary materials.
- I. Operation and Maintenance Data:
1. Maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications:
1. Approved by roofing system manufacturer as installer for roofing system with specified warranty.
 2. Regularly installs specified products.
 3. Installed specified products with satisfactory service on ten (10) similar installations for minimum five years.
 - a. Project Experience List: Provide contact names and addresses for completed projects.
 4. Employs full-time supervisors experienced installing specified system and able to communicate with Contracting Officer's Representative and installer's personnel.
- B. Manufacturer's Field Representative:
1. Manufacturer's full-time technical employee or independent roofing inspector.
 2. Individual certified by Roof Consultants Institute as Registered Roof Observer.

1.7 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.8 STORAGE AND HANDLING

- A. Comply with NRCA Manual storage and handling requirements.
- B. Store products indoors in dry, weathertight facility.
- C. Store adhesives according to manufacturer's instructions.
- D. Protect products from damage during handling and construction operations.
- E. Products stored on the roof deck must not cause permanent deck deflection.

1.9 FIELD CONDITIONS

- A. Environment:
 - 1. Product Temperature: Minimum 40 degrees F and rising before installation.
 - 2. Weather Limitations: Install roofing only during dry current and forecasted weather conditions.

1.10 WARRANTY

- A. Manufacturer's Warranty: Warrant roofing system against material and manufacturing defects and agree to repair any leak caused by a defect in the roofing system materials or workmanship of the installer.
 - 1. Warranty Period: 10 years.
 - 2. ASCE 7-8, Basic Wind Speed, Zone 4.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Roofing System: Fully Adhered roofing membrane, base flashing, roof insulation, fasteners, protection board, vapor retarders, copings, edge metal and walkway pads.

2.2 SYSTEM PERFORMANCE

- A. Design roofing system meeting specified performance:
 - 1. Load Resistance: ASCE/SEI 7; Design criteria as indicated on Drawings.
 - a. Basic Wind Speed (3 second gust): 140 mph.
 - b. Occupancy Category: II.
 - c. Importance Factor: 1.00.
 - d. ASCE 7 Exposure Category: B.
 - e. Mean Roof Height: 44'-0".
 - f. Windward Pressure Coefficient: +0.80.
 - g. Leeward Pressure Coefficient: +0.50.
 - h. Wind Base Shear: 121.69 kips (north/south) and 183.13 kips (east/west).
 - 2. Energy Performance:

- a. EPA Energy Star Listed for low-slope roof products.
- b. ASTM E1980; Minimum 78 Solar Reflectance Index (SRI).
- c. CRRC-1; Minimum 0.70 initial solar reflectance and minimum 0.75 emissivity.
- d. Three-Year Aged Performance: Minimum 0.55 solar reflectance tested in according to ASTM C1549 or ASTM E1918, and minimum 0.75 thermal emittance tested in according to ASTM C1371 or ASTM E408.

2.3 PRODUCTS - GENERAL

- A. Provide roof system components from one manufacturer.

2.4 EPDM ROOFING MEMBRANE

- A. EPDM Sheet: ASTM D4637/D4637M, Type II - internally reinforced.
 - 1. Thickness: 60 mils.
 - 2. Color: white or gray.
- B. Additional Properties:

PROPERTY	TEST METHOD	REQUIREMENT
Shore A Hardness	ASTM D2240	55 to 75 Durometer
Water Vapor Permeance	ASTM E96/E96M	Minimum 0.14 perms Water Method
Fungi Resistance	ASTM G21	After 21 days, no sustained growth or discoloration.

- 1. Use fire retardant membrane when not protected by ballast or pavers. Verify for UL or approval.

2.5 MEMBRANE ACCESSORY MATERIALS

- A. Sheet roofing manufacturer's specified products.
- B. Flashing Sheet: Manufacturer's standard; same material, and color as roofing membrane.
 - 1. Self-curing EPDM flashing adaptable to irregular shapes and surfaces.
 - 2. Minimum Thickness: 0.060 inch.
- C. Factory Formed Flashings: Inside and outside corners, pipe boots, and other special flashing shapes to minimize field fabrication.
- D. Splice Adhesive or Tape: Manufacturer's standard for roofing membrane and flashing sheet.
- E. Splice Lap Sealant: Liquid EPDM rubber for exposed lap edge.
- F. Bonding Adhesive: Manufacturer's standard, to suit substrates.
- G. Termination Bars: Manufacturer's standard, stainless steel or aluminum, 1 inch wide by 1/8 inch thick factory drilled for fasteners.
- H. Pipe Compression Clamp:
 - 1. Stainless steel drawband.
 - 2. Worm drive clamp device.
- I. Fasteners: Manufacturer's standard coated steel with metal or plastic plates, to suit application.
- J. Fastener Sealer: One part elastomeric adhesive sealant.

- K. Temporary Closure Sealers (Night Sealant): Polyurethane two part sealer.
- L. Primers, Splice Tapes, Cleaners, and Butyl Rubber Seals: As specified by roof membrane manufacturer.
- M. Asphalt Roof Cement: ASTM D4586/D4586M.

2.6 SEPARATION SHEET

- A. Polyethylene Film: ASTM D2103, 6 mils thick.
 - 1. Install on metal roof deck, under rigid insulation, lap and tape joints.

2.7 FLEXIBLE TUBING

- A. Closed cell neoprene, butyl polyethylene, vinyl, or polyethylene tube or rod.
- B. Diameter approximately 1-1/2 times joint width.

2.8 PROTECTION BOARD

- A. ½" Perlite or as recommended by the roofing manufacturer.
 - 1. As required by roofing manufacturer and rigid insulation manufacturer for warranty.

2.9 ACCESSORIES

- A. Temporary Protection Materials:
 - 1. Expanded Polystyrene (EPS) Insulation: ASTM C578.
 - 2. Plywood: NIST DOC PS 1, Grade CD Exposure 1.
 - 3. Oriented Strand Board (OSB): NIST DOC PS 2, Exposure 1.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine and verify substrate suitability for product installation with roofing installer and roofing inspector present.
 - 1. Verify roof penetrations are complete, secured against movement.
 - 2. Verify roof deck is adequately secured to resist wind uplift.
 - 3. Verify roof deck is clean, dry, and in-plane ready to receive roofing system.
- B. Correct unsatisfactory conditions before beginning roofing work.

3.2 PREPARATION

- A. Complete roof deck construction before beginning roofing work:
 - 1. Curbs, blocking, edge strips, and other components to which roofing and base flashing is attached in place ready to receive insulation and roofing.
 - 2. Coordinate roofing membrane installation with flashing work and roof insulation work so insulation and flashing are installed concurrently to permit continuous roofing operations.
 - 3. Complete installation of flashing, insulation, and roofing in same day except for the area where temporary protection is required when work is stopped for inclement weather or end of work day.
- B. Dry out surfaces, including roof deck flutes, that become wet from any cause during progress of the work before roofing work is resumed. Apply materials to dry substrates, only.

- C. Broom clean roof decks. Remove dust, dirt and debris.
- D. Remove projections capable of damaging roofing materials.

3.3 TEMPORARY PROTECTION

- A. Install temporary protection consisting of a temporary seal and water cut-offs at the end of each day's work and when work is halted for an indefinite period or work is stopped when precipitation is imminent.
- B. Install temporary cap flashing over top of base flashings where permanent flashings are not in place to protect against water intrusion into roofing system. Securely anchor in place to prevent blow off and damage by construction activities.
- C. Temporarily seal exposed insulation surfaces within roofing membrane.
 - 1. Apply temporary seal and water cut off by extending roofing membrane beyond insulation and securely embedding edge of the roofing membrane in 1/4 inch thick by 2 inches wide strip of temporary closure sealant. Weight roofing membrane edge with sandbags, to prevent displacement; space sandbags maximum 8 feet on center.
 - 2. Direct water away from work. Provide drainage, preventing water accumulation.
 - 3. Check daily to ensure temporary seal remains watertight. Reseal open areas and weight down.
- D. Before the work resumes, cut off and discard portions of roof membrane in contact with temporary seal.
 - 1. Cut minimum 6 inches back from sealed edges and surfaces.
- E. Remove sandbags and store for reuse.

3.4 INSTALLATION, GENERAL

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Architect's consideration.
- B. Comply with NRCA Manual installation requirements.
- C. Comply with UL 580 and UL 1897 for uplift resistance.
- D. Do not allow membrane and flashing to contact surfaces contaminated with asphalt, coal tar, oil, grease, or other substances incompatible with EPDM.

3.5 ROOFING INSTALLATION

- A. Install membrane perpendicular to long dimension of insulation boards.
- B. Begin membrane installation at roof low point and work towards high point. Lap membrane shingled in water flow direction.
- C. Position membrane free of buckles and wrinkles.
- D. Roll membrane out; inspect for defects as membrane is unrolled. Remove defective areas:
 - 1. Allow 30 minutes for membrane to relax before proceeding.
 - 2. Lap edges and ends minimum 3 inches. Clean lap surfaces.
 - 3. Install seam adhesive or tape, unless furnished with factory applied adhesive strips. Apply pressure to develop full adhesion.
 - 4. Check seams to ensure continuous adhesion and correct defects.
 - 5. Finish seam edges with beveled bead of lap sealant.
 - 6. Finish seams same day as membrane is installed.

7. Anchor membrane perimeter to roof deck and parapet wall as indicated on drawings.
- E. Membrane Perimeter Anchorage:
 1. Install batten with fasteners at perimeter of each roof area, curb flashing, expansion joints and similar penetrations on top of roof membrane as indicated on drawings.
- F. Fully Adhered System Installation:
 1. Apply bonding adhesive in quantities required by roofing membrane manufacturer.
 2. Fold sheet back on itself, clean and coat the bottom side of the membrane and the top of substrate with adhesive. Do not coat the lap joint area.
 3. After adhesive has set according to adhesive manufacturer's instructions, roll roofing membrane into adhesive minimizing voids and wrinkles.
 4. Repeat for other half of sheet.
 5. Cut voids and wrinkles to lay flat. Clean and patch cut area.

3.6 FLASHING INSTALLATION

- A. Install flashings on same day as roofing membrane is installed. When flashing cannot be completely installed in one day, complete installation until flashing is watertight and provide temporary covers or seals.
- B. Flashing Roof Drains:
 1. Install roof drain flashing according to roofing membrane manufacturer's instructions.
 - a. Coordinate to set the metal drain flashing in asphalt roof cement, holding cement back from the edge of the metal flange.
 - b. Do not allow roof cement to contact EPDM roofing membrane.
 - c. Adhere roofing membrane to metal flashing with bonding adhesive.
 2. Turn metal drain flashing and roofing membrane down into drain body. Install clamping ring and strainer.
- C. Installing Base Flashing and Pipe Flashing:
 1. Install flashing sheet to pipes, walls and curbs to minimum 8 inches height above roof surfaces and extend roofing manufacturer's standard lap dimension onto roofing membranes.
 - a. Adhere flashing with bonding adhesive.
 - b. Form inside and outside corners of flashing sheet according to NRCA Manual. Form pipe flashing according to NRCA Manual.
 - c. Lap ends roofing manufacturer's standard dimension.
 - d. Adhesively splice flashing sheets together, and adhesively splice flashing sheets to roofing membranes. Finish exposed edges with lap sealant.
 2. Anchor top of flashing to walls and curbs with fasteners spaced maximum 6 inches on center. Use surface mounted fastening strip with sealant on ducts. Use pipe clamps on pipes or other round penetrations.
 3. Apply sealant to top edge of flashing.
- D. Repairs to Membrane and Flashings:
 1. Remove sections of roofing membrane or flashing sheet that are creased, wrinkled, or fishmouthed.
 2. Cover removed areas, cuts and damaged areas with patch extending 4 inches beyond damaged, cut, or removed area. Adhesively splice patch to roofing membrane or flashing sheet. Finish edge of lap with lap sealant.

3.7 FIELD QUALITY CONTROL

1. Fastener Pull Out Tests: ANSI/SPRI FX-1; one test for every 2,500 sq. ft. of deck. Perform tests for each combination of fastener type and roof deck type before installing roof insulation.
 - a. Test at locations selected by Architect or Owner's Representative.
 - b. Do not proceed with roofing work when pull out resistance is less than manufacturer's required resistance.
 2. Examine and probe roofing membrane and flashing seams in presence of Architect, Owner's Representative and Manufacturer's field representative.
 3. Probe seams to detect marginal bonds, voids, skips, and fishmouths.
 4. Cut 4 inch wide by 12 inch long samples through seams where directed by Architect.
 5. Cut one sample for every 1,500 feet of seams.
 6. Cut samples perpendicular to seams.
 7. Failure of samples to pass ASTM D1876 test will be cause for rejection of work.
 8. Repair areas where samples are taken and where marginal bond, voids, and skips occur.
 9. Repair fishmouths and wrinkles by cutting to lay flat. Install patch over cut area extending 4 inches beyond cut.
- B. Manufacturer Services:
1. Inspect initial installation, installation in progress, and completed work.
 2. Issue supplemental installation instructions necessitated by field conditions.
 3. Prepare and submit inspection reports.
 4. Certify completed installation complies with manufacturer's instructions and warranty requirements.

3.8 CLEANING

- A. Remove excess adhesive before adhesive sets.
- B. Clean exposed roofing surfaces. Remove contaminants and stains to comply with specified solar reflectance performance.

3.9 PROTECTION

- A. Protect roofing system from traffic and construction operations.
 1. Protect roofing system when used for subsequent work platform, materials storage, or staging.
 2. Distribute scaffolding loads to exert maximum 50 percent roofing system materials compressive strength.
- B. Loose lay temporary insulation board overlaid with plywood or OSB.
 1. Weight boards to secure against wind uplift.
- C. Remove protection when no longer required and repair damage.

END OF SECTION 07 53 23

SECTION 07 60 00 FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Section includes:
 - 1. Formed sheet metal work for wall and roof flashing, copings, roof edge metal joint covers and drainage specialties.

1.2 RELATED WORK

- A. Manufactured copings: Section 07 70 00 ROOF COPINGS.
- B. Joint Sealants: Section 07 92 00, JOINT SEALANTS.
- C. Paint materials and application: Section 09 91 00, PAINTING.

1.3 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only. Editions of applicable publications current on date of issue of bidding documents apply unless otherwise indicated.
- B. Aluminum Association (AA):
 - AA-C22A41Aluminum Chemically etched medium matte, with clear anodic coating, Class I Architectural, 0.7-mil thick
 - AA-C22A42Chemically etched medium matte, with integrally colored anodic coating, Class I Architectural, 0.7 mils thick
 - AA-C22A44Chemically etched medium matte with electrolytically deposited metallic compound, integrally colored coating Class I Architectural, 0.7-mil thick finish
- C. American National Standards Institute/Single-Ply Roofing Institute (ANSI/SPRI):
 - ANSI/SPRI ES-1-03Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems
- D. American Architectural Manufacturers Association (AAMA):
 - AAMA 620Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Aluminum
 - AAMA 621Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates
- E. ASTM International (ASTM):
 - A240/A240M-14Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications.
 - A653/A653M-11Steel Sheet Zinc-Coated (Galvanized) or Zinc Alloy Coated (Galvanized) by the Hot- Dip Process
 - B32-08.....Solder Metal

- B209-10..... Aluminum and Aluminum-Alloy Sheet and Plate
- B370-12..... Copper Sheet and Strip for Building Construction
- D173-03(R2011) Bitumen-Saturated Cotton Fabrics Used in Roofing and Waterproofing
- D412-06(R2013) Vulcanized Rubber and Thermoplastic Elastomers-Tension
- D1187-97(R2011) Asphalt Base Emulsions for Use as Protective Coatings for Metal
- D1784-11 Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
- D3656-07 Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns
- D4586-07 Asphalt Roof Cement, Asbestos Free
- F. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual.
- G. National Association of Architectural Metal Manufacturers (NAAMM):
 - AMP 500-06 Metal Finishes Manual
- H. Federal Specification (Fed. Spec):
 - A-A-1925A..... Shield, Expansion; (Nail Anchors)
 - UU-B-790A..... Building Paper, Vegetable Fiber
- I. International Code Commission (ICC): International Building Code, Current Edition

1.4 PERFORMANCE REQUIREMENTS

- A. Wind Uplift Forces: Resist the following forces per FM Approvals 1-49:
 - 1. Wind Zone 3: 46 to 104 lbf/sq. ft.: 208-lbf/sq. ft. perimeter uplift force, 312-lbf/sq. ft. corner uplift force, and 104-lbf/sq. ft. outward force.
- B. Wind Design Standard: Fabricate and install copings, roof-edge flashings and other roofing specialties and flashing, tested per ANSI/SPRI ES-1 to resist design pressure indicated on Drawings.

1.5 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings: For all specified items, including:
 - 1. Flashings.
 - 2. Copings.
- C. Manufacturer's Literature and Data: For all specified items, including:
 - 1. Two-piece counterflashing.
 - 2. Thru wall flashing.
 - 3. Non-reinforced, elastomeric sheeting.
- D. Certificates: Indicating compliance with specified finishing requirements, from applicator and contractor.

PART 2 – PRODUCTS

2.1 FLASHING AND SHEET METAL MATERIALS

- A. See drawings for the location of each type of flashing and sheet metal material.

- B. Stainless Steel: ASTM A240, Type 302B, dead soft temper.
- C. Copper ASTM B370, cold-rolled temper.
- D. Bituminous Coated Copper: Minimum copper ASTM B370, weight not less than 3 oz/sf. Bituminous coating shall weigh not less than 6 oz/sf; or, copper sheets may be bonded between two layers of coarsely woven bitumen-saturated cotton fabric ASTM D173. Exposed fabric surface shall be crimped.
- E. Copper Covered Paper: Fabricated of electro-deposit pure copper sheets ASTM B 370, bonded with special asphalt compound to both sides of creped, reinforced building paper, UU-B-790, Type I, style 5, or to a three ply sheet of asphalt impregnated creped paper. Grooves running along the width of sheet.
- F. Polyethylene Coated Copper: Copper sheet ASTM B370, weighing 3 oz/sf bonded between two layers of (two mil) thick polyethylene sheet.
- G. Aluminum Sheet: ASTM B209, alloy 3003-H14 (except alloy used for color anodized aluminum shall be as required to produce specified color). Alloy required to produce specified color shall have the same structural properties as alloy 3003-H14.
- H. Galvanized Sheet: ASTM, A653.
- I. Non-reinforced, Elastomeric Sheeting: Elastomeric substances reduced to thermoplastic state and extruded into continuous homogenous sheet 0.056 inch thick. Sheeting shall have not less than 1,000 psi tensile strength and not more than seven percent tension-set at 50 percent elongation when tested in accordance with ASTM D412. Sheeting shall show no cracking or flaking when bent through 180 degrees over a 1/32 inch diameter mandrel and then bent at same point over same size mandrel in opposite direction through 360 degrees at temperature of -20 °F.

2.2 FLASHING ACCESSORIES

- A. Solder: ASTM B32; flux type and alloy composition as required for use with metals to be soldered.
- B. Rosin Paper: Fed-Spec. UU-B-790, Type I, Grade D, Style 1b, Rosin-sized sheathing paper, weighing approximately 6 lbs/100 sf.
- C. Bituminous Paint: ASTM D1187, Type I.
- D. Fasteners:
 - 1. Use copper, copper alloy, bronze, brass, or stainless steel for copper and copper clad stainless steel, and stainless steel for stainless steel and aluminum alloy. Use galvanized steel or stainless steel for galvanized steel.
 - 2. Nails:
 - a. Minimum diameter for copper nails: 0.109 inch.
 - b. Minimum diameter for aluminum nails 0.105 inch.
 - c. Minimum diameter for stainless steel nails: 0.095 inch and annular threaded.
 - d. Length to provide not less than 7/8 inch penetration into anchorage.
 - 3. Rivets: Not less than 1/8 inch diameter.
 - 4. Expansion Shields: Fed Spec A-A-1925A.
- E. Sealant: As specified in Section 07 92 00, JOINT SEALANTS for exterior locations.
- F. Insect Screening: ASTM D3656, 18 by 18 regular mesh.
- G. Roof Cement: ASTM D4586.

2.3 SHEET METAL THICKNESS

- A. Except as otherwise shown or specified use thickness or weight of sheet metal as follows:
- B. Concealed Locations (Built into Construction):
 - 1. Copper: 10 oz minimum 0.013 inch thick.
 - 2. Stainless steel: 0.010 inch thick.
 - 3. Copper clad stainless steel: 0.010 inch thick.
 - 4. Galvanized steel: 0.021 inch thick.
- C. Exposed Locations:
 - 1. Copper: 16 oz.
 - 2. Stainless steel: 0.015 inch.
 - 3. Copper clad stainless steel: 0.015 inch.
- D. Thickness of aluminum or galvanized steel is specified with each item.

2.4 FABRICATION, GENERAL

- A. Jointing:
 - 1. In general, copper, stainless steel and copper clad stainless steel joints, except expansion and contraction joints, shall be locked and soldered.
 - 2. Jointing of copper over 20 oz weight or stainless steel over 0.018 inch thick shall be done by lapping, riveting and soldering.
 - 3. Joints shall conform to following requirements:
 - a. Flat-lock joints shall finish not less than 3/4 inch wide.
 - b. Lap joints subject to stress shall finish not less than one inch wide and shall be soldered and riveted.
 - c. Unsoldered lap joints shall finish not less than 4 inches wide.
 - 4. Flat and lap joints shall be made in direction of flow.
 - 5. Edges of bituminous coated copper, copper covered paper, non-reinforced elastomeric sheeting and polyethylene coated copper shall be jointed by lapping not less than 4 inches in the direction of flow and cementing with asphalt roof cement or sealant as required by the manufacturer's printed instructions.
 - 6. Soldering:
 - a. Pre tin both mating surfaces with solder for a width not less than 1 1/2 inches of uncoated copper, stainless steel, and copper clad stainless steel.
 - b. Wire brush to produce a bright surface before soldering lead coated copper.
 - c. Treat in accordance with metal producers recommendations other sheet metal required to be soldered.
 - d. Completely remove acid and flux after soldering is completed.
- B. Cleats:
 - 1. Fabricate cleats to secure flashings and sheet metal work over 12 inches wide and where specified.
 - 2. Provide cleats for maximum spacing of 12 inch centers unless specified otherwise.
 - 3. Form cleats of same metal and weights or thickness as the sheet metal being installed unless specified otherwise.

4. Fabricate cleats from 2 inch wide strip. Form end with not less than 3/4 inch wide loose lock to item for anchorage. Form other end of length to receive nails free of item to be anchored and end edge to be folded over and cover nail heads.

C. Edge Strips or Continuous Cleats:

1. Fabricate continuous edge strips where shown and specified to secure loose edges of the sheet metal work.
2. Except as otherwise specified, fabricate edge strips or minimum 24 ounce copper 0.024 inch thick stainless steel 0.050 inch thick aluminum.
3. Use material compatible with sheet metal to be secured by the edge strip.
4. Fabricate in 10 feet maximum lengths with not less than 3/4 inch loose lock into metal secured by edge strip.
5. Fabricate Strips for fascia anchorage to extend below the supporting wood construction to form a drip and to allow the flashing to be hooked over the lower edge at least 3/4-inch.
6. Fabricate anchor edge maximum width of 3 inches or of sufficient width to provide adequate bearing area to insure a rigid installation using 32 oz copper 0.031 inch thick stainless steel 0.0625 inch thick aluminum.

D. Drips:

1. Form drips at lower edge of sheet metal counter-flashings (cap flashings), fascias, gravel stops, wall copings, by folding edge back 1/2 inch and bending out 45 degrees from vertical to carry water away from the wall.
2. Form drip to provide hook to engage cleat or edge strip for fastening for not less than 3/4 inch loose lock where shown.

E. Edges:

1. Edges of flashings concealed in masonry joints opposite drain side shall be turned up 1/4 inch to form dam, unless otherwise specified or shown otherwise.
2. Finish exposed edges of flashing with a 1/4 inch hem formed by folding edge of flashing back on itself when not hooked to edge strip or cleat. Use 1/4 inch minimum penetration beyond wall face with drip for through-wall flashing exposed edge.
3. All metal roof edges shall meet requirements of IBC, current edition.

F. Metal Options:

1. Where options are permitted for different metals use only one metal throughout.
2. Stainless steel may be used in concealed locations for fasteners of other metals exposed to view.
3. Where copper gravel stops, copings and flashings will carry water onto cast stone, stone, or architectural concrete, or stainless steel.

2.5 FINISHES

- A. Use same finish on adjacent metal or components and exposed metal surfaces unless specified or shown otherwise.
- B. In accordance with NAAMM Metal Finishes Manual AMP 500, unless otherwise specified.
- C. Finish exposed metal surfaces as follows, unless specified otherwise:
 1. Copper: Mill finish.
 2. Stainless Steel: Finish No. 2B or 2D.
 3. Aluminum:

- a. Clear Finish: AA-C22A41 medium matte, clear anodic coating, Class 1 Architectural, 0.7 mils thick.
 - b. Colored Finish: AA-C22A42 (anodized) or AA-C22A44 (electrolytically deposited metallic compound) medium matte, integrally colored coating, Class 1 Architectural, 0.7 mils thick. Dyes will not be accepted.
 - c. Fluorocarbon Finish: AAMA 620, high performance organic coating.
 - d. Mill finish.
4. Steel and Galvanized Steel:
- a. Finish painted under Section 09 91 00, PAINTING unless specified as prefinished item.
 - b. Manufacturer's finish:
 - 1) Baked on prime coat over a phosphate coating.
 - 2) Baked-on prime and finish coat over a phosphate coating.
 - 3) Fluorocarbon Finish: AAMA 621, high performance organic coating.

2.6 THROUGH-WALL FLASHINGS

- A. Form through-wall flashing to provide a mechanical bond or key against lateral movement in all directions. Install a sheet having 1/16 inch deep transverse channels spaced four to every one inch, or ribbed diagonal pattern, or having other deformation unless specified otherwise.
 1. Fabricate in not less than 8 feet lengths; 10 feet maximum lengths.
 2. Fabricate so keying nests at overlaps.
- B. For Masonry Work (brick and cast stone) When Concealed Except for Drip:
 1. Either copper, stainless steel, or copper clad stainless steel.
 2. Form an integral dam at least 3/16 inch high at back edge.
 3. Form exposed portions of flashing with drip, approximately 1/4 inch projection beyond wall face.
- C. For Masonry Work (brick and cast stone) When Exposed Edge Forms a Receiver for Counter Flashing:
 1. Use same metal and thickness as counter flashing.
 2. Form an integral dam at least 3/16 inch high at back edge.
 3. Form exposed portion as snap lock receiver for counter flashing upper edge.
- E. Window Sill Flashing and Lintel Flashing:
 1. Use either copper, stainless steel, copper clad stainless steel plane flat sheet, or non-reinforced elastomeric sheeting, bituminous coated copper, copper covered paper, or polyethylene coated copper.
 2. Fabricate flashing at ends with folded corners to turn up 3/16 inch in first vertical masonry joint beyond masonry opening.
 3. Turn up back edge as shown.
 4. Form exposed portion with drip as specified or receiver.
- F. Door Sill Flashing:
 1. Where concealed, use either 20 oz copper, 0.018 inch thick stainless steel, or 0.018 inch thick copper clad stainless steel.
 2. Where shown on drawings as combined counter flashing under threshold, sill plate, door sill, or where subject to foot traffic, use either 24 ounce copper, 0.024 inch stainless steel, or 0.024 inch thick stainless steel.

3. Fabricate flashing at ends to turn up 3/16 inch in first vertical masonry joint beyond masonry opening with folded corners.

2.7 BASE FLASHING

- A. Use metal base flashing at vertical surfaces intersecting built-up roofing without cant strips or where shown.
 1. Use either copper, or stainless steel, thickness specified unless specified otherwise.
 2. When flashing is over 10 inches in vertical height or horizontal width use either 20 oz copper or 0.018 inch stainless steel.
 3. Use stainless steel at aluminum roof curbs where flashing contacts the aluminum.
 4. Use either copper, or stainless steel at pipe flashings.
- B. Fabricate metal base flashing up vertical surfaces not less than 8 inch nor more than 6 inch.
- C. Fabricate roof flange not less than 4 inches wide unless shown otherwise. When base flashing length exceeds 2400 mm (8 feet) form flange edge with 1/2 inch hem to receive cleats.
- D. Form base flashing bent from strip except pipe flashing. Fabricate ends for riveted soldered lap seam joints. Fabricate expansion joint ends as specified.
- E. Pipe Flashing:
 1. Fabricate roof flange not less than 4 inches beyond sleeve on all sides.
 2. Extend sleeve up and around pipe and flange out at bottom not less than 1/2 inch and solder to flange and sleeve seam to make watertight.
 3. At low pipes 8 inch to 18 inch above roof:
 - a. Form top of sleeve to turn down into the pipe at least one inch.
 - b. Allow for loose fit around and into the pipe.
 4. At high pipes and pipes with goosenecks or other obstructions which would prevent turning the flashing down into the pipe:
 - a. Extend sleeve up not less than 12 inch above roofing.
 - b. Allow for loose fit around pipe.

2.8 COUNTERFLASHING

- A. Either copper or stainless steel, unless specified otherwise.
- B. Fabricate to lap base flashing a minimum of 4 inches with drip:
 1. Form lock seams for outside corners. Allow for lap joints at ends and inside corners.
 2. In general, form flashing in lengths not less than 8 feet and not more than 10 feet.
 3. Two-piece, lock in type flashing may be used in-lieu-of one piece counter-flashing.
 4. Manufactured assemblies may be used.
 5. Where counterflashing is installed at new work use an integral flange at the top designed to be extended into the masonry joint or reglet in concrete.
 6. Where counterflashing is installed at existing work use surface applied type, formed to provide a space for the application of sealant at the top edge.
- C. One-piece Counterflashing:
 1. Back edge turned up and fabricate to lock into reglet in concrete.

2. Upper edge formed to extend full depth of masonry unit in mortar joint with back edge turned up 1/4 inch.
- D. Two-Piece Counterflashing:
1. Receiver to extend into masonry wall depth of masonry unit with back edge turned up 1/4 inch and exposed edge designed to receive and lock counterflashing upper edge when inserted.
 2. Counterflashing upper edge designed to snap lock into receiver.
- E. Surface Mounted Counterflashing; one or two piece:
1. Use at existing or new surfaces where flashing cannot be inserted in vertical surface.
 2. One piece fabricate upper edge folded double for 2 1/2 inches with top 3/4 inch bent out to form "V" joint sealant pocket with vertical surface. Perforate flat double area against vertical surface with horizontally slotted fastener holes at 16 inch centers between end holes. Option: One piece surface mounted counter-flashing (cap flashing) may be used. Fabricate as detailed on Plate 51 of SMACNA Architectural Sheet Metal Manual.
 3. Two pieces: Fabricate upper edge to lock into surface mounted receiver. Fabricate receiver joint sealant pocket on upper edge and lower edge to receive counterflashing, with slotted fastener holes at 16 inch centers between upper and lower edge.
- F. Pipe Counterflashing:
1. Form flashing for water-tight umbrella with upper portion against pipe to receive a draw band and upper edge to form a "V" joint sealant receiver approximately 3/4 inch deep.
 2. Fabricate 4 inch over lap at end.
 3. Fabricate draw band of same metal as counter flashing. Use 24 oz copper or 0.013 inch thick stainless steel or copper coated stainless steel.
 4. Use stainless steel bolt on draw band tightening assembly.
 5. Vent pipe counter flashing may be fabricated to omit draw band and turn down one inch inside vent pipe.
- G. Where vented edge decks intersect vertical surfaces, form in one piece, shape to slope down to a point level with and in front of edge-set notched plank; then, down vertically, overlapping base flashing.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General:
1. Install flashing and sheet metal items as shown in Sheet Metal and Air Conditioning Contractors National Association, Inc., publication, ARCHITECTURAL SHEET METAL MANUAL, except as otherwise shown or specified.
 2. Apply Sealant as specified in Section 07 92 00, JOINT SEALANTS.
 3. Apply sheet metal and other flashing material to surfaces which are smooth, sound, clean, dry and free from defects that might affect the application.
 4. Remove projections which would puncture the materials and fill holes and depressions with material compatible with the substrate. Cover holes or cracks in wood wider than 1/4 inch with sheet metal compatible with the roofing and flashing material used.
 5. Coordinate with masonry work for the application of a skim coat of mortar to surfaces of unit masonry to receive flashing material before the application of flashing.
 6. Apply a layer of 15 pound saturated felt followed by a layer of rosin paper to wood surfaces to be covered with copper. Lap each ply 2 inch with the slope and nail with large headed copper nails.

7. Confine direct nailing of sheet metal to strips 12 inch or less wide. Nail flashing along one edge only. Space nail not over 4 inches on center unless specified otherwise.
8. Install bolts, rivets, and screws where indicated, specified, or required in accordance with the SMACNA Sheet Metal Manual. Space rivets at 3 inch on centers in two rows in a staggered position. Use neoprene washers under fastener heads when fastener head is exposed.
9. Coordinate with roofing work for the installation of metal base flashings and other metal items having roof flanges for anchorage and watertight installation.
10. Nail continuous cleats on 3 inch on centers in two rows in a staggered position.
11. Nail individual cleats with two nails and bend end tab over nail heads. Lock other end of cleat into hemmed edge.
12. Install flashings in conjunction with other trades so that flashings are inserted in other materials and joined together to provide a water tight installation.
13. Where required to prevent galvanic action between dissimilar metal isolate the contact areas of dissimilar metal with sheet lead, waterproof building paper, or a coat of bituminous paint.
14. Isolate aluminum in contact with dissimilar metals others than stainless steel, white bronze or other metal compatible with aluminum by:
 - a. Paint dissimilar metal with a prime coat of zinc-chromate or other suitable primer, followed by two coats of aluminum paint.
 - b. Paint dissimilar metal with a coat of bituminous paint.
 - c. Apply an approved caulking material between aluminum and dissimilar metal.
15. Paint aluminum in contact with or built into mortar, concrete, plaster, or other masonry materials with a coat of bituminous paint.
16. Paint aluminum in contact with absorptive materials that may become repeatedly wet with two coats of bituminous paint or two coats of aluminum paint.
17. Bitumen Stops:
 - a. Install bitumen stops for built-up roof opening penetrations through deck and at formed sheet metal gravel stops.
 - b. Nail leg of bitumen stop at 12 inch intervals to nailing strip at roof edge before roofing material is installed.

3.2 THROUGH-WALL FLASHING

A. General:

1. Install continuous through-wall flashing between top of concrete foundation walls and bottom of masonry building walls; at top of concrete floors; under masonry, concrete, or stone copings and elsewhere as shown.
2. Where exposed portions are used as a counterflashings, lap base flashings at least 4 inches and use thickness of metal as specified for exposed locations.
3. Exposed edge of flashing may be formed as a receiver for two piece counter flashing as specified.
4. Terminate exterior edge beyond face of wall approximately 1/4 inch with drip edge where not part of counter flashing.
5. Turn back edge up 1/4 inch unless noted otherwise where flashing terminates in mortar joint or hollow masonry unit joint.
6. Terminate interior raised edge in masonry backup unit approximately 1 1/2 inch into unit unless shown otherwise.
7. Under copings terminate both edges beyond face of wall approximately 1/4 inch with drip edge.

8. Lap end joints at least two corrugations, but not less than 4 inches. Seal laps with sealant.
 9. Where dowels, reinforcing bars and fastening devices penetrate flashing, seal penetration with sealing compound. Sealing compound is specified in Section 07 92 00, JOINT SEALANTS.
 10. Coordinate with other work to set in a bed of mortar above and below flashing so that total thickness of the two layers of mortar and flashing are same as regular mortar joint.
 11. Where ends of flashing terminate turn ends up 1 inch and fold corners to form dam extending to wall face in vertical mortar or veneer joint.
 12. Turn flashing up not less than 8 inch between masonry or behind exterior veneer.
 13. When flashing terminates in reglet extend flashing full depth into reglet and secure with lead or plastic wedges spaced 6 inch on center.
 14. Continue flashing around columns:
 - a. Where flashing cannot be inserted in column reglet hold flashing vertical leg against column.
 - b. Counterflash top edge with 3 inch wide strip of saturated cotton unless shown otherwise. Secure cotton strip with roof cement to column. Lap base flashing with cotton strip 1 1/2 inch.
- B. Flashing at Top of Concrete Foundation Walls Where concrete is exposed. Turn up not less than 200 mm (8 inch) high and into masonry backup mortar joint or reglet in concrete backup as specified.
- C. Flashing at Top of Concrete Floors (except where shelf angles occur): Place flashing in horizontal masonry joint not less than 8 inch below floor slab and extend into backup masonry joint at floor slab 1 1/2 inch.
- D. Flashing at Cavity Wall Construction: Where flashing occurs in cavity walls turn vertical portion up against backup under waterproofing, if any, into mortar joint. Turn up over insulation, if any, and horizontally through insulation into mortar joint.
- E. Flashing at Veneer Walls:
1. Install near line of finish floors over shelf angles or where shown.
 2. Turn up against sheathing.
 3. At stud framing, hem top edge 3/4 inch and secure to each stud with stainless steel fasteners through sheathing.
 4. At concrete backing, extend flashing into reglet as specified.
 5. Coordinate with installation of waterproofing or asphalt felt for lap over top of flashing.
- F. Lintel Flashing when not part of shelf angle flashing:
1. Install flashing full length of lintel to nearest vertical joint in masonry over veneer.
 2. Turn ends up one inch and fold corners to form dam and extend end to face of wall.
 3. Turn back edge up to top of lintel; terminate back edge as specified for back-up wall.
- G. Window Sill Flashing:
1. Install flashing to extend not less than 4 inch beyond ends of sill into vertical joint of masonry or veneer.
 2. Turn back edge up to terminate under window frame.
 3. Turn ends up one inch and fold corners to form dam and extend to face of wall.
- H. Door Sill Flashing:
1. Install flashing under bottom of plate sills of doors over curbs opening onto roofs. Extend flashing out to form counter flashing or receiver for counter flashing over base flashing. Set in sealant.

2. Extend sill flashing 8 inch beyond jamb opening. Turn ends up one inch in vertical masonry joint, extend end to face of wall. Join to counter flashing for water tight joint.
3. Where doors thresholds cover over waterproof membranes install sill flashing over water proof membrane under thresholds. Extend beyond opening to cover exposed portion of waterproof membrane and not less than 6 inch beyond door jamb opening at ends. Turn up approximately 1/4 inch under threshold.

3.3 BASE FLASHING

- A. Install where roof membrane type base flashing is not used and where shown.
 1. Install flashing at intersections of roofs with vertical surfaces or at penetrations through roofs, to provide watertight construction.
 2. Install metal flashings and accessories having flanges extending out on top of the built-up roofing before final bituminous coat and roof aggregate is applied.
 3. Set flanges in heavy trowel coat of roof cement and nail through flanges into wood nailers over bituminous roofing.
 4. Secure flange by nailing through roofing into wood blocking with nails spaced 3 inch on centers or, when flange over 4 inch wide terminate in a 1/2 inch folded edge anchored with cleats spaced 200 mm (8 inch) on center. Secure one end of cleat over nail heads. Lock other end into the seam.
- B. For long runs of base flashings install in lengths of not less than 2400 mm (8 feet) nor more than 3000 mm (ten feet). Install a 75 mm (3 inch) wide slip type, loose lock expansion joint filled with sealant in joints of base flashing sections over 2400 mm (8 feet) in length. Lock and solder corner joints at corners.
- C. Extend base flashing up under counter flashing of roof specialties and accessories or equipment not less than 75 mm (3 inch).

3.4 COUNTERFLASHING

- A. General:
 1. Install counterflashing over and in conjunction with installation of base flashings, except as otherwise specified or shown.
 2. Install counterflashing to lap base flashings not less than 4 inch.
 3. Install upper edge or top of counterflashing not less than 9 inch above top of the roofing.
 4. Lap joints not less than 4 inch. Stagger joints with relation to metal base flashing joints.
 5. Use surface applied counterflashing on existing surfaces and new work where not possible to integrate into item.
 6. When fastening to concrete or masonry, use screws driven in expansion shields set in concrete or masonry. Use screws to wood and sheet metal. Set fasteners in mortar joints of masonry work.
- B. One Piece Counterflashing:
 1. Where flashing is installed at new masonry, coordinate to insure proper height, embed in mortar, and end lap.
 2. Where flashing is installed in reglet in concrete insert upper edge into reglet. Hold flashing in place with lead wedges spaced not more than 200 mm (8 inch) apart. Fill joint with sealant.
 3. Where flashing is surface mounted on flat surfaces.
 - a. When top edge is double folded anchor flat portion below sealant "V" joint with fasteners spaced not over 16 inch on center:
 - 1) Locate fasteners in masonry mortar joints.
 - 2) Use screws to sheet metal or wood.

- b. Fill joint at top with sealant.
 4. Where flashing or hood is mounted on pipe.
 - a. Secure with draw band tight against pipe.
 - b. Set hood and secure to pipe with a one by 1 x 1/8 inch bolt on stainless steel draw band type clamp, or a stainless worm gear type clamp.
 - c. Completely fill joint at top with sealant.
- C. Two-Piece Counterflashing:
 1. Where receiver is installed at new masonry coordinate to insure proper height, embed in mortar, and lap.
 2. Surface applied type receiver:
 - a. Secure to face construction in accordance, with manufacturer's instructions.
 - b. Completely fill space at the top edge of receiver with sealant.
 3. Insert counter flashing in receiver in accordance with fabricator or manufacturer's instructions and to fit tight against base flashing.
- D. Where vented edge occur install so lower edge of counterflashing is against base flashing.
- E. When counter flashing is a component of other flashing install as shown.

3.7 COPINGS

- A. General:
 1. Where shown turn down roof side of coping and extend down over base flashing as specified for counter-flashing. Secure counter-flashing to lock strip in coping at continuous cleat.
 2. Install ends adjoining existing construction so as to form space for installation of sealants. Sealant is specified in Section 07 92 00, JOINT SEALANTS.
- B. Aluminum Coping:
 1. Install with 1/4 inch joint between ends of coping sections.
 2. Install joint covers, centered at each joint, and securely lock in place.

END OF SECTION 07 60 00

**SECTION 07 71 00
ROOF COPINGS**

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies pre-formed (factory) roof copings.
- B. Coping system to be provided with 120 mph Wind Warranty coverage.
- C. Provide a complete system including coping cover, anchor clip, splice plate, fasteners and anchors and all other parts and components required for a complete and functional system, provided by one manufacturer.
- D. All corners, transitions, end caps and other components are to be pre-formed (factory) and pre-finished.
- E. Provide and install copings to provide positive drainage to the roof side of the roof parapet or canopy.

1.2 RELATED WORK:

- A. Sealant Material and Installation: Section 07 92 00, JOINT SEALANTS.

1.3 QUALITY CONTROL:

- A. Provide products of manufacturers regularly engaged in producing the kinds of products specified.
- B. Provide products made by the same manufacturer.
- C. Assemble each accessory to the greatest extent possible before delivery to the site.
- D. Provide each accessory with FM approval listing for class specified.

1.4 PERFORMANCE REQUIREMENTS:

- A. Provide copings that withstand exposure to weather and resist thermal movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, or installation.
- B. Provide copings listed in FM Approvals "RoofNav" and approved for windstorm classification Class I. Identify materials with FM Approval markings.
- C. Manufacture and install roof accessories to allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects.
 - 1. Provide clips that resist rotation and avoid shear stress as a result of thermal movements.
 - 2. For design purposes, base provisions for thermal movement on assumed ambient temperature (range) from minus 0 degrees F, ambient to 180 degrees F.

1.5 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples: Representative sample panel of color-anodized aluminum not less than 4 x 4 inches, except extrusions are to be of a width not less than section to be used. Submit sample that shows coating with integral color and texture. Include manufacturer's identifying label.
- C. Shop Drawings: Each item specified showing design, details of construction, installation and fastenings.
- D. Manufacturer's Literature and Data: Each item specified.
- E. Certificates: Stating that aluminum has been given specified thickness of anodizing.
- F. 20 year warranty with 120 mph wind coverage.

1.6 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. ASTM International (ASTM):
 - A240/A240M-14Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
 - A653/A653M-13Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process
 - A666-10.....Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
 - B209-14.....Aluminum and Aluminum Alloy-Sheet and Plate
 - B209M-14.....Aluminum and Aluminum Alloy-Sheet and Plate (Metric)
 - B221-14.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
 - B221M-13.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes (Metric)
 - B32-08(R2014).....Solder Metal
 - B370-12.....Copper Sheet and Strip for Building Construction
 - B882-10.....Pre-Patinated Copper for Architectural Applications
 - C612-14Mineral Fiber Block and Board Thermal Insulation
 - D1187/D1187M-97 (R2011).....Asphalt-Base Emulsions for Use as Protective Coatings for Metal
 - D1970/D1970M-14.....Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 - D226/D226M-09.....Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
 - D4869/D4969M-05(R2011).....Asphalt-Saturated Organic Felt Underlayment Used In Steep Slope Roofing
- C. National Association of Architectural Metal Manufacturers (NAAMM):
 - AMP 500-06Metal Finishes Manual
- D. American Architectural Manufacturers Association (AAMA):
 - 2605-11High Performance Organic Coatings on Architectural Extrusions and Panels.
 - 611-14Anodized Architectural Aluminum
- E. FM Global (FM):
 - RoofNavApproved Roofing Assemblies and Products

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Aluminum, Extruded: ASTM B221M (B221).
- B. Aluminum Sheet: ASTM B209M (B209).
- C. Galvanized Sheet Steel: ASTM A653/A653M; G-90 coating.

- D. Stainless-Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.
- E. Copper Sheet: ASTM B370, cold-rolled copper sheet, H00 or H01 temper.
- F. Insulation: ASTM C612, Class 1 or 2.
- G. Asphalt Coating: ASTM D1187, Type I, quick setting.

2.2 UNDERLAYMENT:

- A. Self-Adhering Modified Bitumen Underlayment:
 - 1. Provide self-adhering modified bitumen membrane underlayment material in compliance with ASTM D1970/D1970M, suitable for use as underlayment for metal copings.
 - 2. Provide membrane resistant to cyclical elevated temperatures for extended period of time in high heat service conditions (stable after testing at 240 degrees F).
 - 3. Provide membrane with integral non-tacking top surface of polyethylene film or other surface material to serve as separator between bituminous material and metal products to be applied above.
 - 4. Provide primer.
- B. Felt Underlayment: Provide No. 30 asphalt saturated organic, non-perforated felt underlayment in compliance with ASTM D226/D226M, Type II, or ASTM D4869/D4869M.
- C. Slip Sheet: Provide 5 pounds per 100 sf rosin sized unsaturated building paper for slip sheet.

2.3 SOLDER:

- A. Copper Solder conforming to ASTM B32, lead-free solder.

2.4 COPINGS:

- A. Provide pre-formed and pre-finished tapered roof coping system equal to Pac Clad, Pac-Tite Coping.
- B. Flat copings will not be accepted. Install tapered copings so that they slope to the roof or canopy.
- C. Fabricate of aluminum sheet not less than 0.050 inch thick or as required by manufacturer for 120 mph Wind Warranty.
- D. Turn outer edges down each face of wall as shown on construction documents.
- E. Maximum lengths of 12 feet.
- F. Shop fabricate external and internal corners as one-piece assemblies with not less than 12 inch leg lengths.
- G. Provide 4 inch wide 0.032 inch thick watertight joint covers.
- H. Provide anchor gutter bar of 0.032 inch thick with anchor holes formed for underside of joint.
- I. Provide concealed guttered 8" wide splice plate of 0.032 inch thick with butyl or other resilient seal strips anchored to splice plate for underside of joint. Use galvanized steel anchor plate providing compression spring anchoring of coping cover.

2.8 FINISH:

- A. Aluminum Color Anodic Finish AAMA 611: AA-C22A42 (anodized or AA0C22A44 (electrolytically deposited metallic compound), Class 1, Architectural, 0.7 mil thick (min.). Dyes will not be accepted.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Examine substrates, areas, and conditions, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.
- C. Underlayment Installation:
 - 1. Self-Adhering Sheet Underlayment:
 - a. Apply primer as required by manufacturer.
 - b. Comply with temperature restrictions of underlayment manufacturer for installation.
 - c. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses.
 - d. Overlap side edges not less than 3-1/2 inches. Roll laps with roller.
 - e. Cover underlayment within 14 days.
 - f. Apply continuously under copings and roof-edge fascias and gravel stops.
 - 2. Felt Underlayment:
 - a. Install with adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties.
 - b. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.
 - 3. Slip Sheet:
 - a. Install with tape or adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties.
 - b. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.
- D. Install copings at roof parapets and canopies as indicated in the drawings.
- E. Secure with fasteners in accordance with manufacture's printed installation instructions and approved shop drawings unless shown otherwise. Provide fasteners suitable for application, for metal types being secured and designed to meet performance requirements.
- F. Where soldered joints are required, clean surfaces to be soldered, removing oils and foreign matter.
 - 1. Pre-tin edges of sheets to be soldered to a width of 38 mm (1-1/2 inches).
 - 2. Reduce pre-tinning where pre-tinned surface would show in completed work.
 - 3. Tin edges of uncoated copper sheets using solder for copper.
 - 4. Do not use torches for soldering.
 - 5. Heat surfaces to receive solder and flow solder into joint.
 - 6. Fill joint completely.
 - 7. Completely remove flux and spatter from exposed surfaces.
- G. Comply with section 07 92 00, JOINT SEALANTS to install sealants where required by manufactures installation instructions.
- H. Coordinate with roofing work for installation of items in sequence to prevent water infiltration.
- I. Aluminum Coping:
 - 1. Install sections of coping with approximately 1/4-inch space between ends of sections.

2. Center joint gutter bar and covers at joints and lock in place.
3. When snap-on system is installed ensure front and back edges are locked in place.

3.2 PROTECTION OF ALUMINUM:

- A. Provide protection for aluminum against galvanic action wherever dissimilar materials are in contact, by painting the contact surfaces of the dissimilar material with two (2) coats of asphalt coating (complete coverage), or by separating the contact surfaces with a preformed neoprene tape having pressure sensitive adhesive coating on one (1) side.
- B. Paint aluminum in contact with wood, concrete and masonry, or other absorptive materials, that may become repeatedly wet, with two (2) coats of asphalt coating.

3.3 ADJUSTING:

- A. Adjust expansion joints to close tightly and be watertight; insuring maximum allowance for building movement.

3.4 PROTECTION:

- A. Protect copings from damage during installation and after completion of the work from subsequent construction.
- B. If coping is damaged, the entire section must be removed and replaced. Cutting and patching to repair damage will not be permitted.
- C. Scratched coping must be replaced. Touchup painting of damaged factory finish will not be permitted.

END OF SECTION 07 71 00

SECTION 07 92 00 JOINT SEALANTS

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section covers interior and exterior sealant and their application, wherever required for complete installation of building materials or systems.

1.2 RELATED WORK (INCLUDING BUT NOT LIMITED TO THE FOLLOWING):

- A. Glazing: Section 08 80 00, GLAZING.
- B. Mechanical Work: See drawings.
- C. Electrical Work: See drawings.
- D. Plumbing work: See drawings.

1.3 QUALITY ASSURANCE:

- A. Installer Qualifications: An experienced installer with a minimum of three (3) years' experience and who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.
- B. Source Limitations: Obtain each type of joint sealant through one (1) source from a single manufacturer.
- C. Product Testing: Obtain test results from a qualified testing agency based on testing current sealant formulations within a 12-month period.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021.
 - 2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C920, and where applicable, to other standard test methods.
 - 3. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

1.4 CERTIFICATION:

- A. Contractor is to submit to Architect written certification that joints are of the proper size and design, that the materials supplied are compatible with adjacent materials and backing, that the materials will properly perform to provide permanent watertight, airtight or vapor tight seals (as applicable), and that materials supplied meet specified performance requirements.

1.5 SUBMITTALS:

- A. Submit in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.
- B. Contractor certification (see 1.4, A).
- C. Manufacturer's installation instructions for each product used.
- D. Cured samples of exposed sealants for each color.
- E. Manufacturer's Literature and Data:
 - 1. Primers
 - 2. Sealing compound, each type, including compatibility when different sealants are in contact with each other.
- F. Manufacturer warranty.

1.6 PROJECT CONDITIONS:

- A. Environmental Limitations:
 - 1. Do not proceed with installation of joint sealants under following conditions:
 - a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 degrees F.
 - b. When joint substrates are wet.
- B. Joint-Width Conditions:
 - 1. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions:
 - 1. Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 DELIVERY, HANDLING, AND STORAGE:

- A. Deliver materials in manufacturers' original unopened containers, with brand names, date of manufacture, shelf life, and material designation clearly marked thereon.
- B. Carefully handle and store to prevent inclusion of foreign materials.
- C. Do not subject to sustained temperatures exceeding 90 degrees F or less than 40 degrees F.

1.8 DEFINITIONS:

- A. Definitions of terms in accordance with ASTM C717 and as specified.
- B. Backing Rod: A type of sealant backing.
- C. Bond Breakers: A type of sealant backing.
- D. Filler: A sealant backing used behind a back-up rod.

1.9 WARRANTY:

- A. Manufacturer Warranty: Manufacturer shall warranty their sealant for a minimum of five (5) years from the date of installation and final acceptance by the Government. Submit manufacturer warranty.

1.10 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. ASTM International (ASTM):
 - C509-06Elastomeric Cellular Preformed Gasket and Sealing Material
 - C612-14Mineral Fiber Block and Board Thermal Insulation
 - C717-14aStandard Terminology of Building Seals and Sealants
 - C794-10Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
 - C920-14aElastomeric Joint Sealants.
 - C1021-08(R2014)Laboratories Engaged in Testing of Building Sealants
 - C1193-13Standard Guide for Use of Joint Sealants.
 - C1248-08(R2012)Test Method for Staining of Porous Substrate by Joint Sealants
 - C1330-02(R2013)Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants

- C1521-13 Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints
- D217-10 Test Methods for Cone Penetration of Lubricating Grease
- D412-06a(R2013) Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
- D1056-14 Specification for Flexible Cellular Materials—Sponge or Expanded Rubber
- E84-09..... Surface Burning Characteristics of Building Materials
- C. Sealant, Waterproofing and Restoration Institute (SWRI): The Professionals' Guide
- D. Environmental Protection Agency (EPA):
 - 40 CFR 59(2014) National Volatile Organic Compound Emission Standards for Consumer and Commercial Products

PART 2 - PRODUCTS

2.1 SEALANTS:

A. Exterior Sealants:

1. Vertical surfaces, provide non-staining ASTM C920, Type S or M, Grade NS, Class 25.
2. Horizontal surfaces, provide ASTM C920, Type S or M, Grade P, Class 25.
3. Provide location(s) of exterior sealant as follows:
 - a. Joints formed where frames and subsills of windows, doors, louvers, and vents adjoin masonry, concrete, or metal frames. Provide sealant at exterior surfaces of exterior wall penetrations.
 - b. Metal to metal.
 - c. Masonry to masonry.
 - d. Masonry expansion and control joints.
 - e. Wood to masonry.
 - f. Voids where items penetrate exterior walls.
 - g. Metal reglets, where flashing is inserted into masonry joints.

B. Floor Joint Sealant:

1. ASTM C920, Type S or M, Grade P, Class 25.
2. Provide location(s) of floor joint sealant as follows.
 - a. Seats of metal thresholds exterior doors.
 - b. Control and expansion joints in floors, slabs, ceramic tile, and walkways.

C. Interior Sealants:

1. Vertical and Horizontal Surfaces: ASTM C920, Type S or M, Grade NS, Class 25.
2. Provide location(s) of interior sealant as follows:
 - a. Typical narrow joint 1/4 inch or less at walls and adjacent components.
 - b. Perimeter of doors, windows, access panels which adjoin concrete or masonry surfaces.
 - c. Interior surfaces of exterior wall penetrations.
 - d. Joints at masonry walls and columns, piers, concrete walls or exterior walls.

- e. Joints between plumbing fixtures and walls and floors.

2.2 COLOR:

- A. Sealants used with exposed masonry are to match color of mortar joints.
- B. Color of sealants for other locations to match the adjacent substrate or fixture as selected by Architect.

2.3 JOINT SEALANT BACKING:

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 - 1. Type C: Closed-cell material with a surface skin.
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056 or synthetic rubber (ASTM C509), nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 32 degrees C (minus 26 degrees F). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.4 FILLER:

- A. Mineral fiberboard: ASTM C612, Class 1.
- B. Thickness same as joint width.
- C. Depth to fill void completely behind back-up rod.

2.5 PRIMER:

- A. As recommended by manufacturer of caulking or sealant material.
- B. Stain free type.

2.6 CLEANERS-NON POROUS SURFACES:

- A. Chemical cleaners compatible with sealant and acceptable to manufacturer of sealants and sealant backing material. Cleaners to be free of oily residues and other substances capable of staining or harming joint substrates and adjacent non-porous surfaces and formulated to promote adhesion of sealant and substrates.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Inspect substrate surface for bond breaker contamination and unsound materials at adherent faces of sealant.
- B. Coordinate for repair and resolution of unsound substrate materials.
- C. Inspect for uniform joint widths and that dimensions are within tolerance established by sealant manufacturer.

3.2 PREPARATIONS:

- A. Prepare joints in accordance with manufacturer's instructions and SWRI (The Professionals' Guide).
- B. Clean surfaces of joint to receive caulking or sealants leaving joint dry to the touch, free from frost, moisture, grease, oil, wax, lacquer paint, or other foreign matter that would tend to destroy or impair adhesion.
 - 1. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.
 - 2. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include but are not limited to the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous surfaces include but are not limited to the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- C. Do not cut or damage joint edges.
- D. Apply non-staining masking tape to face of surfaces adjacent to joints before applying primers, caulking, or sealing compounds.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- E. Apply primer to sides of joints wherever required by compound manufacturer's printed instructions or as indicated by pre-construction joint sealant substrate test.
 - 1. Apply primer prior to installation of back-up rod or bond breaker tape.
 - 2. Use brush or other approved means that will reach all parts of joints. Avoid application to or spillage onto adjacent substrate surfaces.

3.3 BACKING INSTALLATION:

- A. Install backing material, to form joints enclosed on three sides as required for specified depth of sealant.
- B. Where deep joints occur, install filler to fill space behind the backing rod and position the rod at proper depth.
- C. Cut fillers installed by others to proper depth for installation of backing rod and sealants.
- D. Install backing rod, without puncturing the material, to a uniform depth, within plus or minus 1/8 inch for sealant depths specified.
- E. Where space for backing rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.

3.4 SEALANT DEPTHS AND GEOMETRY:

- A. At widths up to 1/4 inch, sealant depth equal to width.
- B. At widths over 1/4 inch, sealant depth 1/2 of width up to 1/2 inch maximum depth at center of joint with sealant thickness at center of joint approximately 1/2 of depth at adhesion surface.

3.5 INSTALLATION:

- A. General:
 - 1. Apply sealants and caulking only when ambient temperature is between 40 degrees and 100 degrees F.
 - 2. Do not install polysulfide base sealants where sealant may be exposed to fumes from bituminous materials, or where water vapor in continuous contact with cementitious materials may be present.
 - 3. Do not install sealant type listed by manufacture as not suitable for use in locations specified.
 - 4. Apply caulking and sealing compound in accordance with manufacturer's printed instructions.
 - 5. Avoid dropping or smearing compound on adjacent surfaces.
 - 6. Fill joints solidly with compound and finish compound smooth.
 - 7. Tool exposed joints to form smooth and uniform beds, with slightly concave surface conforming to joint configuration per Figure 5A in ASTM C1193 unless shown or specified otherwise in construction documents. Remove masking tape immediately after tooling of sealant and before sealant face starts to "skin" over. Remove any excess sealant from adjacent surfaces of joint, leaving the working in a clean finished condition.
 - 8. Finish paving or floor joints flush unless joint is otherwise detailed.
 - 9. Apply compounds with nozzle size to fit joint width.
 - 10. Test sealants for compatibility with each other and substrate. Use only compatible sealant. Submit test reports.
 - 11. Replace sealant which is damaged during construction process.
- B. For application of sealants, follow requirements of ASTM C1193 unless specified otherwise. Take all necessary steps to prevent three-sided adhesion of sealants.
- C. Interior Sealants: Where gypsum board partitions are of sound rated, fire rated, or smoke barrier construction, follow requirements of ASTM C919 only to seal all cut-outs and intersections with the adjoining construction unless specified otherwise.
 - 1. Apply a 1/4 inch minimum bead of sealant each side of runners (tracks), including those used at partition intersections with dissimilar wall construction.
 - 2. Coordinate with application of gypsum board to install sealant immediately prior to application of gypsum board.
 - 3. Partition intersections: Seal edges of face layer of gypsum board abutting intersecting partitions, before taping and finishing or application of veneer plaster-joint reinforcing.
 - 4. Openings: Apply a 1/4 inch bead of sealant around all cutouts to seal openings of electrical boxes, ducts, pipes and similar penetrations. To seal electrical boxes, seal sides and backs.
 - 5. Control Joints: Before control joints are installed, apply sealant in back of control joint to reduce flanking path for sound through control joint.

3.6 FIELD QUALITY CONTROL:

- B. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements.

3.7 CLEANING:

- A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with a solvent as recommended by manufacturer of the adjacent material or if not otherwise indicated by the caulking or sealant manufacturer.
- B. Leave adjacent surfaces in a clean and unstained condition.

END OF SECTION 07 92 00

SECTION 08 11 13 HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies steel doors, steel frames and related components.
- B. Terms relating to steel doors and frames as defined in ANSI A123.1 and as specified.

1.2 SUBMITTALS

- A. Submit in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.
- B. Manufacturers Literature and Data.
- C. Shop drawings showing each type of door and frame.

1.3 SHIPMENT

- A. Prior to shipment label each door and frame to show location, size, door swing and other pertinent information.
- B. Fasten temporary steel spreaders across the bottom of each door frame.

1.4 STORAGE AND HANDLING

- A. Store doors and frames at the site under cover.
- B. Protect from rust and damage during storage and erection until completion.

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. Door and Hardware Institute (DHI):
 - A115 Series.....Steel Door and Frame Preparation for Hardware, Series A115.1 through A115.17 (Dates Vary)
- C. Steel Door Institute (SDI):
 - 113-01 (R2006)Thermal Transmittance of Steel Door and Frame Assemblies
 - 128-09Acoustical Performance for Steel Door and Frame Assemblies
- D. American National Standard Institute:
 - A250.8-2003 (R2008).....Specifications for Standard Steel Doors and Frames
- E. American Society for Testing and Materials (ASTM):
 - A568/568-M-11Steel, Sheet, Carbon, and High-Strength, Low-alloy, Hot-Rolled and Cold-Rolled
 - A1008-10.....Steel, sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy and High Strength Low Alloy with Improved Formability
 - D1621-10Compressive Properties of Rigid Cellular Plastics
- F. The National Association Architectural Metal Manufacturers (NAAMM):
 - Metal Finishes Manual (AMP 500-06)
- G. National Fire Protection Association (NFPA):

80-13 Fire Doors and Fire Windows

- H. Underwriters Laboratories, Inc. (UL): Fire Resistance Directory
- I. Intertek Testing Services (ITS): Certifications Listings...Latest Edition
- J. Factory Mutual System (FM): Approval Guide

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Sheet Steel: ASTM A1008, cold-rolled for panels (face sheets) of doors.
- B. Anchors, Fastenings and Accessories: Fastenings anchors, clips connecting members and sleeves from zinc coated steel.
- C. Prime Paint: Paint that meets or exceeds the requirements of A250.8.

2.2 FABRICATION GENERAL

- A. GENERAL:
 - 1. Follow ANSI A250.8 for fabrication of standard steel doors, except as specified otherwise. Doors to receive hardware specified in Section 08 71 00, DOOR HARDWARE. Tolerances as per ANSI A250.8. Thickness, 1-3/4 inches, unless otherwise shown.
 - 2. Close top edge of exterior doors flush and seal to prevent water intrusion.
 - 3. When vertical steel stiffeners are used for core construction, fill spaces between stiffeners with mineral fiber insulation.
- B. Standard Duty Doors: ANSI A250.8, Level 1, flush seamless design of size and design shown. Use for interior locations only.

2.3 METAL FRAMES

- A. General:
 - 1. ANSI A250.8, 0.053 inch thick sheet steel, types and styles as shown or scheduled.
 - 2. Frames for exterior doors: Fabricate from 0.067 inch thick galvanized steel conforming to ASTM A525.
- B. Frame Anchors:
 - 1. Floor anchors:
 - a. Where floor fills occur, provide extension type floor anchors to compensate for depth of fill.
 - b. At bottom of jamb use 0.053 inch thick steel clip angles welded to jamb and drilled to receive two 1/4 inch floor bolts. Use 2 inch by 2 inch 3/8 inch clip angle for lead lined frames, drilled for 3/8 inch floor bolts.
 - c. Where mullions occur, provide 0.093 inch thick steel channel anchors, drilled for two 1/4 inch floor bolts and frame anchor screws.
 - d. Where sill sections occur, provide continuous 0.042 inch thick steel rough bucks drilled for 1/4 inch floor bolts and frame anchor screws. Space floor bolts at 24 inches on center.
 - 2. Jamb anchors:
 - a. Locate anchors on jambs near top and bottom of each frame, and at intermediate points not over 24 inches apart.
 - b. Form jamb anchors of not less than 0.042 inch thick steel unless otherwise specified.

- c. Anchors set in masonry: Use adjustable anchors designed for friction fit against the frame and for extension into the masonry not less than 10 inches. Use one of following type:
 - 1) Wire loop type of 3/16 inch diameter wire.
 - 2) T-shape or strap and stirrup type of corrugated or perforated sheet steel.
- d. Anchors for stud partitions: Either weld to frame or use lock-in snap-in type. Provide tabs for securing anchor to the sides of the studs.
- e. Anchors for frames set in prepared openings:
 - 1) Steel pipe spacers with 1/4 inch inside diameter welded to plate reinforcing at jamb stops or hat shaped formed strap spacers, 2 inches wide, welded to jamb near stop.
 - 2) Drill jamb stop and strap spacers for 1/4 inch flat head bolts to pass thru frame and spacers.
 - 3) Two piece frames: Subframe or rough buck drilled for 1/4 inch bolts.
- f. Anchors for observation windows and other continuous frames set in stud partitions.
 - 1) In addition to jamb anchors, weld clip anchors to sills and heads of continuous frames over 4 feet long.
 - 2) Anchors spaced 24 inches on centers maximum.
- g. Modify frame anchors to fit special frame and wall construction and provide special anchors where shown or required.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Plumb, align and brace frames securely until permanent anchors are set.
 - 1. Use triangular bracing near each corner on both sides of frames with temporary wood spreaders at midpoint.
 - 2. Use wood spreaders at bottom of frame if the shipping spreader is removed.
 - 3. Protect frame from accidental abuse.
 - 4. Where construction will permit concealment, leave the shipping spreaders in place after installation, otherwise remove the spreaders after the frames are set and anchored.
 - 5. Remove wood spreaders and braces only after the walls are built and jamb anchors are secured.
- B. Floor Anchors:
 - 1. Anchor the bottom of door frames to floor with two 1/4 inch diameter expansion bolts. Use 3/8 inch bolts on lead lined frames.
 - 2. Power actuated drive pins may be used to secure frame anchors to concrete floors.
- C. Jamb Anchors:
 - 1. Anchors in masonry walls: Embed anchors in mortar. Fill space between frame and masonry wall with grout or mortar as walls are built.
 - 2. Coat frame back with a bituminous coating prior to lining of grout filling in masonry walls.
 - 3. Secure anchors to sides of studs with two fasteners through anchor tabs. Use steel drill screws to steel studs.
 - 4. Frames set in prepared openings of masonry or concrete: Expansion bolt to wall with 1/4 inch expansion bolts through spacers. Where subframes or rough bucks are used, 1/4 inch expansion

bolts on 24 inch centers or power activated drive pins 24 inches on centers. Secure two piece frames to subframe or rough buck with machine screws on both faces.

3.2 INSTALLATION OF DOORS AND APPLICATION OF HARDWARE

Install doors and hardware as specified in Sections Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, Section 08 14 00, WOOD DOORS and Section 08 71 00, DOOR HARDWARE.

END OF SECTION 08 11 13

SECTION 08 14 00 INTERIOR WOOD DOORS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies interior, flush solid core and stile and rail, wood doors.

1.2 RELATED WORK

- A. Metal door frames: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.
- B. Door hardware including hardware location (height): Section 08 71 00, DOOR HARDWARE.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.
- B. Samples:
 - 1. Corner section of flush veneered door 12 inches square, showing details of construction, labeled to show grade and type number and conformance to specified standard.
 - 2. Veneer sample 8 inch by 11 inch by 1/4 inch showing specified wood species sanded to receive a transparent finish. Factory finish veneer sample where the prefinished option is accepted.
- C. Shop Drawings:
 - 1. Show every door in project and schedule location in building.
 - 2. Indicate type, grade, finish and size; include detail of glazing, louvers and other pertinent details.
 - 3. Provide information concerning specific requirements not included in the manufacturer's literature and data submittal.

1.4 WARRANTY

- A. Manufacturer's warranty for lifetime of original installation.

1.5 DELIVERY AND STORAGE

- A. Factory seal doors and accessories in minimum of 6 mil. polyethylene bags or cardboard packages which shall remain unbroken during delivery and storage.
- B. Store in accordance with WDMA I.S.1-A, Job Site Information.
- C. Label package for door opening where used.

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. Window and Door Manufacturers Association (WDMA):
 - I.S.1A-13 Architectural Wood Flush Doors
 - I.S.4-13..... Water-Repellent Preservative Non-Pressure Treatment for Millwork
 - I.S.6A-13 Architectural Wood Stile and Rail Doors
 - T.M.6-14 Adhesive (Glue Bond) Durability Test Method
 - T.M.7-14 Cycle-Slam Test Method

T.M.8-14 Hinge Loading Test Method

T.M.10-14 Screwholding Test Method

PART 2 - PRODUCTS

2.1 FLUSH DOORS

A. General:

1. Meet requirements of WDMA I.S.1-A, Extra Heavy Duty.
2. Adhesive: Type II
3. Thickness: 1-3/4 inches unless otherwise shown or specified.
4. Give exposed wood parts of exterior doors a water-repellent preservative treatment in accordance with WDMA I.S.4.

B. Face Veneer:

1. In accordance with WDMA I.S.1-A.
2. One species throughout the project unless scheduled or otherwise shown.
3. For transparent finishes: Premium Grade. rotary cut, white Birch.
 - a. A grade face veneer standard optional.
 - b. AA grade face veneer
 - c. Match face veneers for doors for uniform effect of color and grain at joints.
 - d. Door edges shall be same species as door face veneer except maple may be used for stile face veneer on birch doors.
4. Factory sand doors for finishing.

C. Wood for stops, louvers, muntins and moldings of flush doors required to have transparent finish:

1. Solid Wood of same species as face veneer, except maple may be used on birch doors.
2. Glazing:
 - a. On non-labeled doors use applied wood stops nailed tight on room side and attached on opposite side with flathead, countersunk wood screws, spaced approximately 125 mm (5 inches) on centers.
 - b. Use stainless steel or dull chrome plated brass screws for exterior doors.
3. Wood Louvers:
 - a. Door manufacturer's standard product, fabricated of solid wood sections.
 - b. Wood Slats: Not less than 5 mm (3/16 inch) thick.
 - c. Stiles routed out to receive slats.
 - d. Secure louvers in prepared cutouts with wood stops.

D. Stiles and Rails:

1. Option for wood stiles and rails:
 - a. Composite material having screw withdrawal force greater than minimum performance level value when tested in accordance with WDMA T.M.10.
2. Provide adequate blocking for bottom of doors having mechanically operated door bottom seal meeting or exceeding the performance duty level per T.M.10 for horizontal door edge screw holding.

2.2 STILE AND RAIL DOORS

- A. Meeting requirements of WDMA I.S.6A
- B. Ponderosa pine doors of size and design shown.
- C. Grade: Premium.
- D. Door Panels:
 - 1. Grain of face of panels parallel with longest dimensions of panel.
 - 2. Flat panels: Veneered composite core, not less than 5/8 inch thick.
 - 3. Raised panels: Unless otherwise shown, thickness of raised panels not less than the following:
 - a. For 1-3/8 inch and 1-3/4 inch thick doors: 1-1/8 inch thick
 - b. For 2-1/4 inch thick doors: 1-5/8 inch thick
- E. Stops and Molds:
 - 1. Solid sticking both sides, of same material as stiles and rails, coped at intersections.
 - 2. Glazed openings applied wood stops nailed on interior side of door.
- F. Louvers: Size as shown.

2.3 PREFINISH, PREFIT OPTION

- A. Flush doors may be factory machined to receive hardware, bevels, undercuts, cutouts, accessories and fitting for frame.
- B. Factory fitting to conform to specification for shop and field fitting, including factory application of sealer to edge and routings.
- C. Flush doors to receive transparent finish (in addition to being prefit) may be factory finished as follows:
 - 1. WDMA I.S.1-A Section F-3 specification for System TR-4, Conversion Varnish or System TR-5, Catalyzed Vinyl.
 - 2. Use stain when required to produce the finish specified in Section 09 06 00 SCHEDULE FOR FINISHES.

2.4 IDENTIFICATION MARK:

- A. On top edge of door.
- B. Either a stamp, brand or other indelible mark, giving manufacturer's name, door's trade name, construction of door, code date of manufacture and quality.
- C. Accompanied by either of the following additional requirements:
 - 1. An identification mark or a separate certification including name of inspection organization.
 - 2. Identification of standards for door, including glue type.
 - 3. Identification of veneer and quality certification.
 - 4. Identification of preservative treatment for stile and rail doors.

2.5 SEALING:

Give top and bottom edge of doors two coats of catalyzed polyurethane or water resistant sealer before sealing in shipping containers.

PART 3 - EXECUTION

3.1 DOOR PREPARATION

- A. Field, shop or factory preparation: Do not violate the qualified testing and inspection agency label requirements for fire rated doors.
- B. Clearances between Doors and Frames and Floors:
 - 1. Maximum 1/8 inch clearance at the jambs, heads, and meeting stiles, and a 3/4 inch clearance at bottom, except as otherwise specified.
 - 2. Maximum clearance at bottom of sound rated doors, light-proofed doors, doors to operating rooms, and doors designated to be fitted with mechanical seal: 3/8 inch.
- C. Provide cutouts for special details required and specified.
- D. Rout doors for hardware using templates and location heights specified in Section, 08 71 00 DOOR HARDWARE.
- E. Fit doors to frame, bevel lock edge of doors 1/8 inch for each two inches of door thickness.
- F. Immediately after fitting and cutting of doors for hardware, seal cut edges of doors with two coats of water resistant sealer.
- G. Finish surfaces, including both faces, top and bottom and edges of the doors smooth to touch.
- H. Apply a steel astragal on the opposite side of active door on pairs of fire rated doors.
- I. Apply a steel astragal to meeting style of active leaf of pair of doors or double egress smoke doors.

3.2 INSTALLATION OF DOORS APPLICATION OF HARDWARE

Install doors and hardware as specified in this Section.

3.3 DOOR PROTECTION

- A. As door installation is completed, place polyethylene bag or cardboard shipping container over door and tape in place.
- B. Provide protective covering over knobs and handles in addition to covering door.
- C. Maintain covering in good condition until removal is approved by Resident Engineer.

END OF SECTION 08 14 00

SECTION 08 51 13 ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Aluminum windows of type and size shown, complete with hardware, related components and accessories.
- B. Types:
 - 1. Hung windows

1.2 DEFINITIONS

- A. Accessories: Mullions, staff beads, casings, closures, trim, moldings, panning systems, sub-sills, clips anchors, fasteners, weather-stripping, insect screens // mechanical operators, // and other necessary components required for fabrication and installation of window units.
- B. Uncontrolled Water: Water not drained to the exterior, or water appearing on the room side of the window.

1.3 RELATED WORK

- A. Glazing: Section 08 80 00, GLAZING.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Protect windows from damage during handling and construction operations before, during and after installation.
- B. Store windows under cover, setting upright.
- C. Do not stack windows flat.
- D. Do not lay building materials or equipment on windows.

1.5 QUALITY ASSURANCE

- A. Approval by contracting officer is required of products or service of proposed manufacturers and installers.
- B. Approval will be based on submission of certification by Contractor that:
 - 1. Manufacturer regularly and presently manufactures the specified windows as one of its principal products.
 - 2. Installer has technical qualifications, experience, trained personnel and facilities to install specified items.
- C. Provide each type of window produced from one source of manufacture.
- D. Quality Certified Labels or certificate:
 - 1. Architectural Aluminum Manufacturers Association, "AAMA label" affixed to each window indicating compliance with specification.
 - 2. Certificates in lieu of label with copy of recent test report (not more than 4 years old) from an independent testing laboratory and certificate signed by window manufacturer stating that windows provided comply with specified requirements and AAMA 101/I.S.2/A440 for type of window specified.

1.6 SUBMITTAL

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings:
 - 1. Minimum of 1/2 full scale // types of windows on project //.
 - 2. Identifying parts of window units by name and kind of metal or material, show construction, locking systems, mechanical operators, trim, installation and anchorages.
 - 3. Include glazing details and standards for factory glazed units.
- C. Manufacturer's Literature and Data:
 - Window.
 - Sash locks, keepers, and key.
- D. Certificates:
 - 1. Certificates as specified in paragraph QUALITY ASSURANCE.
 - 2. Indicating manufacturers and installers qualifications.
 - 3. Manufacturer's Certification that windows delivered to project are identical to windows tested.
- E. Test Reports:
 - Copies of test reports as specified in paragraph QUALITY ASSURANCE.
- F. Samples: Provide 150 mm (six-inch) length samples showing finishes, specified.

1.7 WARRANTY

Warrant windows against malfunctions due to defects in thermal breaks, hardware, materials and workmanship, subject to the terms of Article "WARRANTY OF CONSTRUCTION", FAR clause 52.246-21, except provide 10 year warranty period.

1.8 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)
 - 90.1-07Energy Standard of Buildings
- C. American Architectural Manufacturers Association (AAMA):
 - 101/I.S.2/A440-11Windows, Doors, and Unit Skylights
 - 505-09Dry Shrinkage and Composite Performance Thermal Cycling Test Procedures
 - 2605-05Superior Performing Organic Coatings on Architectural Aluminum Extrusions and Panels
 - TIR-A8-08.....Structural Performance of Poured and Debridged Framing Systems
- D. American Society for Testing and Materials (ASTM):
 - A653/A653M-09Steel Sheet, Zinc Coated (Galvanized), Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-dip Process
 - E 90-09.....Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
- E. National Fenestration Rating Council (NFRC):

- NFRC 100-10 Determining Fenestration Product U-Factors
- NFRC 200-10 Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence
- F. National Association of Architectural Metal Manufacturers (NAAMM):
 - AMP 500-06 Metal Finishes Manual

PART 2- PRODUCTS

2.1 MATERIALS

- A. Aluminum Extrusions; Sheet and Plate: AAMA 101/I.S.2/A440.
- B. Sheet Steel, Galvanized: ASTM A653; G90 galvanized coating.
- C. Weather-strips: AAMA 101/I.S.2/A440; except leaf type weather-stripping is not permitted.
- D. Insect Screening:
 - 1. Regular mesh, 18 by 18, AAMA 101/I.S.2/A440.
 - 2. Aluminum with dark bronze anodized finish unless specified otherwise.
- E. Fasteners: AAMA 101/I.S.2/A440. Screws, bolts, nuts, rivets and other fastening devices to be non-magnetic stainless steel.
 - 1. Fasteners to be concealed when window is closed. Where wall thickness is less than 3 mm (0.125 inch) thick, provide backup plates or similar reinforcements for fasteners.
 - 2. Stainless steel self tapping screws may be used to secure Venetian blind hanger clips, vent guide blocks, friction adjuster, and limit opening device.
 - 3. Attach locking and hold-open devices to windows with concealed fasteners. Provide reinforcing plates where wall thickness is less than 3 mm (0.125 inch) thick.
- F. Weather-strips: AAMA 101/I.S.2/A440.
- G. Hardware:
 - 1. Locks: Two position locking bolts or cam type tamperproof custodial locks with a single point control located not higher than five feet from floor level. Locate locking devices in the vent side rail. Fastenings for locks and keepers shall be concealed or nonremovable.
 - 2. Locking Device Strikes: Locate strikes in frame jamb. Strikes shall be adjustable for locking tension. Fabricate strikes from Type 304 stainless steel or white bronze.
 - 3. Fabricate hinges of noncorrosive metal. Hinges may be either fully concealed when window is closed or semi-concealed with exposed knuckles. All exposed knuckle hinges shall have hospital tips, at both ends. Surface mounted hinges will not be accepted.
 - 4. Guide Blocks: Fabricate guide blocks of injection molded nylon. Install guide block fully concealed in vent/frame sill.
 - 5. Hardware for Emergency Ventilation of Windows:
 - a. Provide windows with a hold open linkage for emergency ventilation.
 - b. Hold open hardware shall provide for maximum six inches of window opening and shall include an adjustable friction shoe to provide resistance when closing the window.
 - c. Handles shall be removable.
 - 6. Hardware for Maintenance Opening of Windows: Opening beyond the six inch position shall be accomplished with a window washers key. The release device shall capture the key when window is in the open position.

7. Design operating device to prevent opening with standard tools, coins or bent wire devices.

H. Pole Operators:

1. Provide pole operator and pole hanger where operable windows have hardware more than 1500 mm five feet) above the floor, but not over 3000 mm (10 feet) above floor.
2. Fabricate pole of tubular anodized aluminum with rubber cap at lower end and standard push-pull hook at top end to match hardware design.
3. Provide sufficient length for window operation without reaching more than 1500 mm (five feet) above floor.

2.2 THERMAL AND CONDENSATION PERFORMANCE

- A. Condensation Resistance Factor (CRF): Minimum CRF of // C 45 // C 50 // C 55 //.
- B. Thermal Transmittance:
 1. Maximum U value class for insulating glass windows: 50 (U=0.50).
 2. Maximum U value class for dual glazed windows: 70 (U=0.70), or as required by ASHRAE 90.1.
- C. Solar Heat Gain Coefficient (SHGC): SHGC shall comply with State or local energy code requirement.

2.3 FABRICATION

- A. Fabrication to exceed or meet requirements of Physical Load Tests, Air Infiltration Test, and Water Resistance Test of AAMA 101/I.S.2/A440.
- B. Glazing:
 1. Factory or field glazing optional.
 2. Glaze in accordance with Section 08 80 00, GLAZING.
 3. Windows reglazable without dismantling sash framing.
 4. Design rabbet to suit glass thickness and glazing method specified. // Increase rabbet depths for plastic glazing when used; minimum, depth of 25 mm (1-inch). //
 5. Glaze from interior except where not accessible.
 - //6. In Security Bedrooms and Security Psychiatric Nursing Units, glaze from outside, except where detention screens occur, or cavity side of dual glazed windows. //
 7. Provide removable fin type glazing beads.
- C. Trim:
 1. Trim includes casings, closures, and panning.
 2. Fabricate to shapes shown of aluminum not less than 1.6 mm (0.062 inch) thick
 3. Extruded or formed sections, straight, true, and smooth on exposed surfaces. // Curved sections true to line. //
 4. Exposed external corners mitered and internal corners coped; fitted with hairline joints.
 5. Reinforce 1.6 mm (0.062 inch) thick members with not less than 3 mm (1/8-inch) thick aluminum.
 6. Except for strap anchors, provide reinforcing for fastening near ends and at intervals not more than 305 mm (12 inches) between ends.
 7. Design to allow unrestricted expansion and contraction of members and window frames.
 8. Secure to window frames with machine screws or expansion rivets.
 9. Exposed screws, fasteners or pop rivets are not acceptable on exterior of the casing or trim cover system.

D. Thermal-Break Construction:

1. Manufacturer's Standard.
2. Low conductance thermal barrier.
3. Capable of structurally holding sash in position and together.
4. All Thermal Break Assemblies (Pour & Debridge, Insulbar or others) shall be tested as per AAMA TIR A8 and AAMA 505 for Dry Shrinkage and Composite Performance.
5. Location of thermal barrier and design of window shall be such that, in closed position, outside air shall not come in direct contact with interior frame of the window.

E. Mullions: AAMA 101/I.S.2/A440.

F. Subsills and Stools:

1. Fabricate to shapes shown of not less than 2 mm (0.080 inch) thick extruded aluminum.
2. One piece full length of opening with concealed anchors.
3. Sills turned up back edge not less than 6 mm (1/4 inch). Front edge provide with drip.
4. Sill back edge behind face of window frame. Do not extend to interior surface or bridge thermal breaks.
5. Do not perforate for anchorage, clip screws, or other requirements.

G. Insect Screens:

1. AAMA 101/I.S.2/A440.
2. // Aluminum // Vinyl clad aluminum // screen cloth.

2.4 DOUBLE HUNG WINDOWS:

- A. AAMA 101/I.S.2/A440. //Single // double // Triple // hung type // H-DW-LC25 // H-HC40 // H-AW40 //.
- B. AAMA certified product to the AAMA 101/I.S.2/A440.-11 standard.
 1. Provide units with "Tilt-in" feature permitting both sides of both sash to be cleaned from interior.
 2. Do not tilt-in sash without use of a maintenance only release mechanism and removable locking handle. Finger operated tilt latches not acceptable. //

2.5 CASEMENT WINDOWS

- A. AAMA 101/I.S.2/A440; Type: // C-H65 // C-AW65//.
- B. AAMA certified product to the AAMA 101/I.S.2/A440. - 11 standard.

2.6 PROJECTED WINDOWS

- A. AAMA 101/I.S.2/A440; Type: // C-H65 // C-AW65//.
- B. AAMA certified product to the AAMA 101/I.S.2/A440. - 11 standard.
- C. Operation:
 1. Upper ventilators: Project-out and slide down from top.
 2. Hopper vents: Project-in from top and slide up from bottom.

2.7 DUAL HORIZONTAL SLIDING WINDOWS

- A. AAMA 101/I.S.2/A440
- B. AAMA certified product to the AAMA 101/I.S.2/A440. - 11 standard.
- C. Type //HS-C40 // HS-AW40 //.

2.8 SINGLE SASH HORIZONTAL SLIDING WINDOWS

- A. AAMA 101/I.S.2/A440; Type: // HS-HC40 // HS-AW40//.
- B. AAMA certified product to the AAMA 101/I.S.2/A440. - 11 standard.

2.9 FIXED WINDOWS

- A. AAMA 101/I.S.2/A440; Type // HC25 // F-AW65. //.
- B. AAMA certified product to the AAMA 101/I.S.2/A440. - 11 standard.

2.10 FINISH

- A. In accordance with NAAMM AMP 500 series.
- B. Finish exposed aluminum surfaces as follows:
 - 1. Anodized Aluminum:
 - a. Finish in accordance with AMP 501 letters and numbers.
 - b. Clear anodized Finish: AA-C22A41 Medium matte, clear anodic coating, Class 1 Architectural, 0.7 mils thick.
 - c. Colored anodized Finish: AA-C22A42 (anodized) or AA-C22A44 (electrolytically deposited metallic compound) medium matte, integrally colored coating, Class 1 Architectural, 0.7 mils thick.
 - 1) Dyes not accepted.
 - 2) Variation of more than 50 percent of maximum shade range approved will not be accepted in a single window or in adjacent windows and mullions on a continuous series.
 - 2. Coated Aluminum:
 - a. AMP 501 and 505.
 - b. Fluorocarbon Finish: AAMA 2605, superior performing organic coating.
- C. Steel: AMP 504.
- D. Stainless steel: AMP 503.
 - 1. Concealed: 2B or 2D.
 - 2. Exposed: No. 4 unless specified otherwise.
- E. Hardware: Finish hardware exposed when window is in the closed position: Match window color.

PART 3 - EXECUTION

3.1 PROTECTION (DISSIMILAR MATERIALS): AAMA 101/I.S.2/A440.

3.2 INSTALLATION, GENERAL

- A. Install window units in accordance with manufacturer's specifications and recommendations for installation of window units, hardware, operators and other components of work.
- B. Where type, size or spacing of fastenings for securing window accessories or equipment to building construction is not shown or specified, use expansion or toggle bolts or screws, as best suited to construction material.
 - 1. Provide bolts or screws minimum 6 mm (1/4-inch) in diameter.
 - 2. Sized and spaced to resist the tensile and shear loads imposed.
 - 3. Do not use exposed fasteners on exterior, except when unavoidable for application of hardware.

4. Provide non-magnetic stainless steel Phillips flat-head machine screws for exposed fasteners, where required, or special tamper-proof fasteners.
5. Locate fasteners to not disturb the thermal break construction of windows.
- C. Set windows plumb, level, true, and in alignment; without warp or rack of frames or sash.
- D. Anchor windows on four sides with anchor clips or fin trim.
 1. Do not allow anchor clips to bridge thermal breaks.
 2. Use separate clips for each side of thermal breaks.
 3. Make connections to allow for thermal and other movements.
 4. Do not allow building load to bear on windows.
 5. Use manufacturer's standard clips at corners and not over 600 mm (24 inches) on center.
 6. Where fin trim anchorage is shown build into adjacent construction, anchoring at corners and not over 600 mm (24 inches) on center.
- E. Sills and Stools:
 1. Set in bed of mortar or other compound to fully support, true to line shown.
 2. Do not extend sill to inside window surface or past thermal break.
 3. Leave space for sealants at ends and to window frame unless shown otherwise.

3.3 MULLIONS CLOSURES, TRIM, AND PANNING

- A. Cut mullion full height of opening and anchor directly to window frame on each side.
- B. Closures, Trim, and Panning: External corners mitered and internal corners coped, fitted with hairline, tightly closed joints.
- C. Secure to concrete or solid masonry with expansion bolts, expansion rivets, split shank drive bolts, or powder actuated drive pins.
- D. Toggle bolt to hollow masonry units. Screwed to wood or metal.
- E. Fasten except for strap anchors, near ends and corners and at intervals not more than 300 mm (12 inches) between.
- F. Seal units following installation to provide weathertight system.

3.4 ADJUST AND CLEAN

- A. Adjust ventilating sash and hardware to provide tight fit at contact points, and at weather-stripping for smooth operation and weathertight closure.
- B. Clean aluminum surfaces promptly after installation of windows, exercising care to avoid damage to protective coatings and finishes.
- C. Remove excess glazing and sealant compounds, dirt, and other substances.
- D. Lubricate hardware and moving parts.
- E. Clean glass promptly after installation of windows. Remove glazing and sealant compound, dirt and other substances.
- F. Except when a window is being adjusted or tested, keep locked in the closed position during the progress of work on the project.

3.5 OPERATION DEVICES

- A. Provide wrenches, keys, or removable locking operating handles, as specified to operate windows.

END OF SECTION 08 51 13

SECTION 08 71 00 DOOR HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Door hardware and related items necessary for complete installation and operation of doors.

1.2 RELATED WORK

- A. 08 11 13 HOLLOW METAL DOORS AND FRAMES
- B. 08 14 00 INTERIOR WOOD DOORS

1.3 GENERAL

- A. All hardware shall comply with Uniform Federal Accessible Standards (UFAS).
- B. Hardware for Exit Doors: Conform to requirements of NFPA 101 for exit doors.
- C. Hardware for application on metal and wood doors and frames shall be made to standard templates. Furnish templates to the fabricator of these items in sufficient time so as not to delay the construction.
- D. The following items shall be of the same manufacturer, except as otherwise specified:
 - 1. Mortise locksets.
 - 2. Hinges for hollow metal and wood doors.
 - 3. Surface applied overhead door closers.
 - 4. Exit devices.
 - 5. Floor closers.

1.4 WARRANTY

- A. Locks, latchsets, and panic hardware: 5 years.
- B. Door closers: 10 years.
- C. All other hardware: 1 year

1.5 MAINTENANCE MANUALS

- A. Furnish maintenance manuals and instructions on all door hardware. Provide installation instructions with the submittal documentation.

1.6 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.
- B. Hardware Schedule: Prepare and submit hardware schedule to include, as a minimum;
 - 1. Hardware item.
 - 2. Quantity.
 - 3. Manufacturer and catalog number.
 - 4. Size (where applicable).
 - 5. Finish
 - 6. UL Designation (where applicable)

- C. Manufacturers' Literature: Provide manufacturer's literature showing size, shape, finish, construction, UL designation, and other pertinent data required to show compliance with specifications.

1.7 DELIVERY

- A. Deliver items of hardware to job site in their original containers, complete with necessary appurtenances including screws, keys, and instructions.

1.8 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. In text, hardware items are referred to by series, types, etc., listed in such specifications and standards, except as otherwise specified.
- B. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):
 - A156.1-06..... Butts and Hinges
 - A156.2-03..... Bored and Pre-assembled Locks and Latches
 - A156.3-08..... Exit Devices, Coordinators, and Auto Flush Bolts
 - A156.4-08..... Door Controls (Closers)
 - A156.5-14..... Cylinders and Input Devices for Locks.
 - A156.12-05 Interconnected Locks and Latches
 - A156.13-05..... Mortise Locks and Latches Series 1000
 - A156.16-08..... Auxiliary Hardware
 - A156.18-06..... Materials and Finishes
 - A156.21-09..... Thresholds
 - A156.28-07 Master Keying Systems
 - A156.31-07 Electric Strikes and Frame Mounted Actuators
 - A250.8-03..... Standard Steel Doors and Frames
- C. National Fire Protection Association (NFPA):
 - 101-09 Life Safety Code
- D. Underwriters Laboratories, Inc. (UL):
 - Building Materials Directory (2008)

PART 2 - PRODUCTS

2.1 BUTT HINGES

- A. ANSI A156.1. Provide only three-knuckle hinges. The following types of butt hinges shall be used for the types of doors listed, except where otherwise specified:
 - 1. Exterior Doors: Type A2112/A5112 for doors 3 feet wide or less and Type A2111/A5111 for doors over 3 feet wide. Hinges for exterior outswing doors shall have non-removable pins.
 - 2. Interior Doors: Type A8112/A5112 for doors 3 feet wide or less and Type A8111/A5111 for doors over 3 feet wide.
- B. Provide 3 hinges per door.

2.2 OVERHEAD CLOSERS

- A. Conform to ANSI A156.4, Grade 1.
- B. Closers shall conform to the following:
 - 1. The closer shall have minimum 50 percent adjustable closing force over minimum value for that closer and have adjustable hydraulic back check effective between 60 degrees and 85 degrees of door opening.
 - 2. Where specified, closer shall have hold-open feature.
 - 3. Material of closer body shall be forged or cast.
 - 4. Arm and brackets for closers shall be steel, malleable iron or high strength ductile cast iron.
 - 5. Where closers are exposed to the exterior or are mounted in rooms that experience high humidity, provide closer body and arm assembly of stainless steel material.
 - 6. Closers shall have full size metal cover; plastic covers will not be accepted.
 - 7. Closers shall have adjustable hydraulic back-check, separate valves for closing and latching speed, adjustable back-check positioning valve, and adjustable delayed action valve.
 - 8. Provide closers with any accessories required for the mounting application, including (but not limited to) drop plates, special soffit plates, spacers for heavy-duty parallel arm fifth screws, bull-nose or other regular arm brackets, longer or shorter arm assemblies, and special factory templating. Provide special arms, drop plates, and templating as needed to allow mounting at doors with overhead stops and/or holders.
 - 9. Closer arms or backcheck valve shall not be used to stop the door from overswing, except in applications where a separate wall, floor, or overhead stop cannot be used.
 - 10. Provide parallel arm closers with heavy duty rigid arm.
 - 11. Where closers are to be installed on the push side of the door, provide parallel arm type except where conditions require use of top jamb arm.
 - 12. Provide all surface closers with the same body attachment screw pattern for ease of replacement and maintenance.
 - 13. All closers shall have a 1 ½" minimum piston diameter.

2.3 DOOR STOPS

- A. Conform to ANSI A156.16.
- B. Provide door stops wherever an opened door or any item of hardware thereon would strike a wall, column, equipment or other parts of building construction.
- C. Where cylindrical locks with turn pieces or pushbuttons occur, equip wall bumpers Type L02251 (rubber pads having concave face) to receive turn piece or button.
- D. Provide floor stops (Type L02141 or L02161 in office areas; Type L02121 x 3 screws into floor elsewhere. Wall bumpers, where used, must be installed to impact the trim or the door within the leading half of its width. Floor stops, where used, must be installed within 4-inches of the wall face and impact the door within the leading half of its width.
- E. Where drywall partitions occur, use floor stops, Type L02141 or L02161 in office areas, Type L02121 elsewhere.
- F. Provide stop Type L02011, at applicable for exterior doors. At outswing doors where stop can be installed in concrete, provide stop mated to concrete anchor set in 76mm (3-inch) core-drilled hole and filled with quick-setting cement.
- G. Omit stops where floor mounted door holders are required and where automatic operated doors occur.

- H. Provide appropriate roller bumper for each set of doors (except where closet doors occur) where two doors would interfere with each other in swinging.
- I. Provide overhead surface applied stop Type C02541, ANSI A156.8 on patient toilet doors in bedrooms where toilet door could come in contact with the bedroom door.

2.4 LOCKS AND LATCHES

- A. Conform to ANSI A156.2. Locks and latches shall have beveled fronts. Lock cylinders shall have not less than six pin. Cylinders for all locksets shall be removable core type. Cylinders shall be furnished with construction removable cores and construction master keys. Cylinder shall be removable by special key or tool. Construct all cores so that they will be interchangeable into the core housings of all mortise locks, rim locks, cylindrical locks, and any other type lock included in the Great Grand Master Key System. Disassembly of lever or lockset shall not be required to remove core from lockset. Provide temporary keying device or construction core to allow opening and closing during construction and prior to the installation of final cores.
- B. In addition to above requirements, locks and latches shall comply with following requirements:
 - 1. Cylindrical Lock and Latch Sets: levers shall meet ADA (Americans with Disabilities Act) requirements. Cylindrical locksets shall be series 4000 Grade I. All locks and latchsets shall be furnished with 4-7/8-inch curved lip strike and wrought box. At outswing pairs with overlapping astragals, provide flat lip strip with 7/8-inch lip-to-center dimension.
 - 2. Lever design to be selected by Architect from manufacturer's standard options.

2.5 ELECTRIC STRIKES

- A. ANSI/ BHMA A156.31 Grade 1.
- B. General: Use fail-secure electric strikes at fire-rated doors.

2.6 KEYS

- A. Stamp all keys with change number and key set symbol.
- B. Coordinate with Owner for keying and master keying requirements.
- C. Provide no less than two (2) keys per lock.

2.7 KICK PLATES

- A. Conform to ANSI Standard A156.6.
- B. Provide protective plates as specified below:
 - 1. Kick plates of metal, Type J100 series.

2.8 EXIT DEVICES

- A. Conform to ANSI Standard A156.3. Exit devices shall be Grade 1; type and function are specified in hardware sets. Provide flush with finished floor strikes for vertical rod exit devices in interior of building. Trim shall have cast satin stainless steel lever handles of design similar to locksets, unless otherwise specified. Provide key cylinders for keyed operating trim and, where specified, cylinder dogging.
- B. Surface vertical rod panics shall only be provided less bottom rod; provide fire pins as required by exit device and door fire labels. Do not provide surface vertical rod panics at exterior doors.
- C. Concealed vertical rod panics shall be provided less bottom rod at interior doors, unless lockable or otherwise specified; provide fire pins as required by exit device and door fire labels. Where concealed vertical rod panics are specified at exterior doors, provide with both top and bottom rods.
- D. Where removable mullions are specified at pairs with rim panic devices, provide mullion with key-removable feature.

- E. At non-rated openings with panic hardware, provide panic hardware with key cylinder dogging feature.
- F. Exit devices for fire doors shall comply with Underwriters Laboratories, Inc., requirements for Fire Exit Hardware. Submit proof of compliance.

2.9 THRESHOLDS

- A. Conform to ANSI A156.21, mill finish extruded aluminum, except as otherwise specified. In existing construction, thresholds shall be installed in a bed of sealant with ¼-20 stainless steel machine screws and expansion shields. In new construction, embed aluminum anchors coated with epoxy in concrete to secure thresholds. Furnish thresholds for the full width of the openings.
- B. For thresholds at elevators entrances see other sections of specifications.
- C. At exterior doors and any interior doors exposed to moisture, provide threshold with non-slip abrasive finish.
- D. Provide with miter returns where threshold extends more than 12 mm (0.5 inch) beyond face of frame.

2.10 WEATHERSTRIPS (FOR EXTERIOR DOORS)

- A. Conform to ANSI A156.22. Air leakage shall not to exceed 0.50 CFM per foot of crack length (0.000774m³/s/m).

2.11 MISCELLANEOUS HARDWARE

- A. Silencers: Conform to ANSI A156.16. Provide door silencers on all interior doors.

2.12 FINISHES

- A. Exposed surfaces of hardware shall have ANSI A156.18, finishes as specified below.
- B. 626 or 630: All surfaces on exterior and interior of buildings, except where other finishes are specified.
- C. Miscellaneous Finishes:
 - 1. Hinges --exterior doors: 626 or 630.
 - 2. Hinges --interior doors: 652 or 630.
 - 3. Door Closers: Factory applied paint finish. Dull or Satin Aluminum color.
 - 4. Thresholds: Mill finish aluminum.
 - 5. Other primed steel hardware: 600.

2.13 BASE METALS

- A. Apply specified U.S. Standard finishes on different base metals as following:

Finish	Base Metal
652	Steel
626	Brass or bronze
630	Stainless steel

PART 3 - EXECUTION

3.1 HARDWARE HEIGHTS

- A. Locate all hardware to comply with Uniform Federal Accessible Standards (UFAS).

3.2 INSTALLATION

- A. Closer devices, including those with hold-open features, shall be equipped and mounted to provide maximum door opening permitted by building construction or equipment. Unless indicated otherwise, closers shall be mounted on side of door inside rooms and away from corridors. At exterior doors, closers shall be mounted on interior side. Where closers are mounted on doors they shall be mounted with sex nuts and bolts; foot shall be fastened to frame with machine screws.
- B. Hinge Size Requirements: 4 1/2 inches.
- C. Hinge leaves shall be sufficiently wide to allow doors to swing clear of door frame trim and surrounding conditions.
- D. Hinges Required Per Door: 3.
- E. Fastenings: Suitable size and type and shall harmonize with hardware as to material and finish. Provide machine screws and lead expansion shields to secure hardware to concrete, ceramic or quarry floor tile, or solid masonry. Fiber or rawl plugs and adhesives are not permitted. All fastenings exposed to weather shall be of nonferrous metal.
- F. After locks have been installed; show in presence of Owner that keys operate their respective locks in accordance with Owner's keying requirements.

3.3 HARDWARE SETS

- A. Hardware sets are provided in the drawings.

END OF SECTION 8 71 00

SECTION 08 80 00 GLAZING

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies the following:
 - 1. Glass for Conference Room Windows.

1.2 LABELS:

- A. Temporary labels:
 - 1. Provide temporary label on each light of glass identifying manufacturer or brand and glass type, quality and nominal thickness.
 - 2. Label in accordance with NFRC label requirements.
 - 3. Temporary labels are to remain intact until glass is approved by Architect.
- B. Permanent labels:
 - 1. Locate in corner for each glass unit.
 - 2. Label in accordance with ANSI Z97.1 and SGCC label requirements.
 - a. Tempered glass.

1.3 PERFORMANCE REQUIREMENTS:

- A. General: Design glazing system consistent with guidance and practices presented in the GANA Glazing Manual.
- B. Glazing Unit Design: Design glass, including engineering analysis meeting requirements of authorities having jurisdiction. Thicknesses listed are minimum. Coordinate thicknesses with glazing types, sizes, orientations, and connections/frames.
- C. Comply with applicable requirements of the 2012 International Building Code, Chapter 24, Glass and Glazing.

1.4 SUBMITTALS:

- A. In accordance with Section 01 33 00, SUBMITTAL PROCEDURES.
- B. Manufacturer Warranty.
- C. Manufacturer's Literature and Data:
 - 1. Glass, each kind required.
 - 2. Glazing cushion.
- D. Samples:
 - 1. Size: 12 inches by 12 inches.

1.5 DELIVERY, STORAGE AND HANDLING:

- A. Delivery: Schedule delivery to coincide with glazing schedules so minimum handling of crates is required. Do not open crates except as required for inspection for shipping damage.
- B. Storage: Store cases according to printed instructions on case, in areas least subject to traffic or falling objects. Keep storage area clean and dry.

- C. Handling: Unpack cases following printed instructions on case. Stack individual units on edge leaned slightly against upright supports with separators between each.

1.6 PROJECT CONDITIONS:

- A. Field Measurements: Field measure openings before ordering glazing units.

1.7 WARRANTY:

- A. Manufacturer Warranty: Manufacturer shall warranty their glazing from the date of installation and final acceptance by the Owner as follows. Submit manufacturer warranty.
 - 1. Tempered glass units warranted against defects for five (5) years.

PART 2 - PRODUCT

2.1 GLASS:

- A. Provide minimum thickness stated and as additionally required to meet performance requirements.
 - 1. Provide minimum 1/2 inch thick glass units unless otherwise indicated.
- B. Obtain glass units from single source from single manufacturer for each glass type.
- C. Clear Glass:
 - 1. ASTM C1036, Type I, Class 1, Quality q3.

2.2 HEAT-TREATED GLASS:

- A. Roller Wave Limits for Heat-Treated Glass: Orient all roller wave distortion parallel to bottom surface of glazing, and provide units complying with the following limitations:
 - 1. Measurement Parallel to Line: Maximum peak to valley 0.008 inch.
 - 2. Measurement Perpendicular to Line: Maximum 0.001 inch.
 - 3. Bow/Warp: Maximum 50 percent of bow and warp allowed by ASTM C1048.
- B. Clear Tempered Glass:
 - 1. ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3.

2.12 GLAZING ACCESSORIES:

- A. As required to install glass units in a square and plumb manner.
- B. As required to ensure a structurally stable and sound condition.
- C. As required to allow for movement to the degree required to ensure that units will not break.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Verification of Conditions:
 - 1. Examine openings for glass units; determine they are proper size; plumb; square; and level before installation is started.
 - 2. Verify that glazing openings conform to details, dimensions and tolerances indicated on manufacturer is approved shop drawings.

- B. Review for conditions which may adversely affect glass and glazing unit installation, prior to commencement of installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Determine glazing unit size and edge clearances by measuring the actual opening to receive the glazing.
- C. Shop fabricate and cut glass with smooth, straight edges of full size required by openings to provide GANA recommended edge clearances.
- D. Verify that components used are compatible.
- E. Clean and dry glazing surfaces.

3.3 INSTALLATION – GENERAL:

- A. Install in accordance with GANA Glazing Manual.
- B. Set glazing without bending, twisting, or forcing of units.
- C. Do not allow glass to rest on or contact any framing member.
- D. Tempered Glass: Install with roller distortions in horizontal position unless otherwise directed.

3.13 REPLACEMENT AND CLEANING:

- A. Clean new glass surfaces removing temporary labels, paint spots, and defacement after approval by Architect.
- B. Replace cracked, broken, and imperfect glass, or glass which has been installed improperly.
- C. Leave setting material in clean, whole, and acceptable condition.

3.14 PROTECTION:

- A. Protect finished surfaces from damage during erection, and after completion of work.

3.15 MONOLITHIC GLASS SCHEDULE:

- A. Reception Desk Partitions: Glass Type MG#: Clear fully tempered float glass.
 - 1. Unit Thickness: ½ inch.
 - 2. Safety glazing label required.

END OF SECTION 08 80 00

SECTION 09 29 00 GYPSUM BOARD

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies installation and finishing of gypsum board.

1.2 RELATED WORK

- A. Interior partition framing: Section 06 10 00 Rough Carpentry

1.3 TERMINOLOGY

- A. Definitions and description of terms shall be in accordance with ASTM C11, C840, and as specified.
- B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by the trusses or bar joists.
- C. "Yoked": Gypsum board cut out for opening with no joint at the opening (along door jamb or above the door).

1.4 SUBMITTALS

- A. None required.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

- A. In accordance with the requirements of ASTM C840.

1.6 ENVIRONMENTAL CONDITIONS

- A. In accordance with the requirements of ASTM C840.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD

- A. Gypsum Board: ASTM C1396, Type X, 5/8 inch thick unless shown otherwise. Shall contain a minimum of 20 percent recycled gypsum.
- B. Water Resistant Gypsum Backing Board: ASTM C620, Type X, 5/8 inch thick. Whether shown on drawings or not, provide water resistant gypsum board behind all plumbing fixtures and no less than 24" beyond the outermost edge on each side and from floor and no less than 24" above the top most edge.

- C. Gypsum cores shall contain maximum percentage of post-industrial recycled gypsum content available in the area (a minimum of 95 percent post-industrial recycled gypsum content). Paper facings shall contain 100 percent post-consumer recycled paper content.

2.3 ACCESSORIES

- A. ASTM C1047, except form of 0.015 inch thick zinc coated steel sheet or rigid PVC plastic.
- B. Flanges not less than 7/8 inch wide with punch outs or deformations as required to provide compound bond.

2.4 FASTENERS

- A. ASTM C1002 and ASTM C840, except as otherwise specified.
- B. ASTM C954, for steel studs thicker than 0.33 inch.
- C. Select screws of size and type recommended by the manufacturer of the material being fastened.
- D. For fire rated construction, type and size same as used in fire rating test.
- E. Clips: Zinc-coated (galvanized) steel; gypsum board manufacturer's standard items.

2.5 FINISHING MATERIALS AND LAMINATING ADHESIVE

- A. ASTM C475 and ASTM C840. Free of antifreeze, vinyl adhesives, preservatives, biocides and other VOC. Adhesive shall contain a maximum VOC content of 50 g/l.

PART 3 - EXECUTION

3.2 INSTALLING GYPSUM BOARD

- A. Coordinate installation of gypsum board with other trades and related work.
- B. Install gypsum board in accordance with ASTM C840, except as otherwise specified.
- C. Moisture and Mold-Resistant Assemblies: Provide and install moisture and mold-resistant glass mat gypsum wallboard products with moisture-resistant surfaces complying with ASTM C1658 where shown and in locations which might be subject to moisture exposure during construction.
- D. Use gypsum boards in maximum practical lengths to minimize number of end joints.
- E. Bring gypsum board into contact, but do not force into place.
- F. Ceilings:
 - 1. For single-ply construction, use perpendicular application.
 - 2. For two-ply assemblies:
 - a. Use perpendicular application.

- b. Apply face ply of gypsum board so that joints of face ply do not occur at joints of base ply with joints over framing members.

G. Walls:

1. When gypsum board is installed parallel to framing members, space fasteners 12 inches on center in field of the board, and 200 mm (8 inches) on center along edges.
2. When gypsum board is installed perpendicular to framing members, space fasteners 12 inches on center in field and along edges.
3. Stagger screws on abutting edges or ends.
4. For single-ply construction, apply gypsum board with long dimension either parallel or perpendicular to framing members as required to minimize number of joints except gypsum board shall be applied vertically over "Z" furring channels.
5. For two-ply gypsum board assemblies, apply base ply of gypsum board to assure minimum number of joints in face layer. Apply face ply of wallboard to base ply so that joints of face ply do not occur at joints of base ply with joints over framing members.
6. For three-ply gypsum board assemblies, apply plies in same manner as for two-ply assemblies, except that heads of fasteners need only be driven flush with surface for first and second plies. Apply third ply of wallboard in same manner as second ply of two-ply assembly, except use fasteners of sufficient length enough to have the same penetration into framing members as required for two-ply assemblies.
7. No offset in exposed face of walls and partitions will be permitted because of single-ply and two-ply or three-ply application requirements.
8. Installing Two Layer Assembly Over Sound Deadening Board:
 - a. Apply face layer of wallboard vertically with joints staggered from joints in sound deadening board over framing members.
 - b. Fasten face layer with screw, of sufficient length to secure to framing, spaced 12 inches on center around perimeter, and 16 inches on center in the field.
9. Control Joints ASTM C840 and as follows:
 - a. Locate at both side jambs of openings if gypsum board is not "yoked". Use one system throughout.
 - b. Not required for wall lengths less than 30 feet.
 - c. Extend control joints the full height of the wall or length of

H. Electrical and Telecommunications Boxes:

1. Seal annular spaces between electrical and telecommunications receptacle boxes and gypsum board partitions.

I. Accessories:

1. Set accessories plumb, level and true to line, neatly mitered at corners and intersections, and securely attach to supporting surfaces as specified.

2. Install in one piece, without the limits of the longest commercially available lengths.
3. Corner Beads:
 - a. Install at all vertical and horizontal external corners and where shown.
 - b. Use screws only. Do not use crimping tool.
4. Edge Trim (casings beads):
 - a. At both sides of expansion and control joints unless shown otherwise.
 - b. Where gypsum board terminates against dissimilar materials and at perimeter of openings, except where covered by flanges, casings or permanently built-in equipment.
 - c. Where gypsum board surfaces of non-load bearing assemblies abut load bearing members.
 - d. Where shown.

3.5 FINISHING OF GYPSUM BOARD

- A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840. Use Level 4 finish for all finished areas open to public view.
- B. Before proceeding with installation of finishing materials, assure the following:
 1. Gypsum board is fastened and held close to framing or furring.
 2. Fastening heads in gypsum board are slightly below surface in dimple formed by driving tool.

3.6 REPAIRS

- A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including non-decorated surfaces.
- B. Patch holes or openings 1/2 inch or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.
- C. Repair holes or openings over 1/2 inch diameter, or equivalent size, with 5/8 inch thick gypsum board secured in such a manner as to provide solid substrate equivalent to undamaged surface.

END OF SECTION 09 29 00

SECTION 09 65 13 RESILIENT BASE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the installation of rubber base.

1.2 SUBMITTALS

- A. Manufacturer's Literature and Data:
 - 1. Description of each product.
 - 2. Base manufacturer's recommendations for adhesives.
 - 3. Application and installation instructions.
- B. Samples:
 - 1. Base: Manufacturer's color selector / samples.

1.3 DELIVERY

- A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.
- B. Materials from containers which have been distorted, damaged or opened prior to installation will be rejected.

1.4 STORAGE

- A. Store materials in weather tight and dry storage facility.
- B. Protect material from damage by handling and construction operations before, during, and after installation.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Use only products by the same manufacturer and from the same production run.

2.2 RESILIENT BASE

- A. ASTM F1861, 1/8 inch thick, 4 inches high, Style-B rubber cove base.
- B. Where carpet occurs, use Style A-straight.
- C. Colors to be selected from manufacturer's standard line.

2.3 ADHESIVES

- A. Use products recommended by the material manufacturer for the conditions of use.
- B. Use low-VOC adhesive during installation. Water based adhesive with low VOC is preferred over solvent based adhesive.

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

- A. Maintain temperature of materials above 70 °F, for 48 hours before installation.
- B. Maintain temperature of rooms where work occurs, between 70°F and 80°F for at least 48 hours, before, during, and after installation.

3.2 PREPARATION

- A. Examine surfaces on which material is to be installed.
- B. Patch and repair cracks, voids, etc.in existing gypsum board.
- C. Do not use adhesive for leveling or filling.
- D. Substrate area dry and cured. Perform manufacturer's recommended bond and moisture test.
- E. Preparation of existing installation:
 - 1. Remove existing base including adhesive.
 - 2. Do not use solvents to remove adhesives.
 - 3. Prepare substrate as specified.

3.3 BASE INSTALLATION

- A. Location:
 - 1. Install base at new gypsum board partitions.
 - 2. Install base at toe kick space under new cabinets.
- B. Application:
 - 1. Apply adhesive uniformly with no bare spots.
 - 2. Set base with joints aligned and butted to touch for entire height.
 - 3. Before starting installation, layout base material to provide the minimum number of joints with no strip less than 600 mm (24 inches) length.
 - a. Short pieces to save material will not be permitted.
 - b. Locate joints as remote from corners as the material lengths or the wall configuration will permit.
- C. Form corners and end stops as follows:
 - 1. Score back of outside corner.
 - 2. Score face of inside corner and notch cove.
- D. Roll base for complete adhesion.

3.4 CLEANING AND PROTECTION

- A. Clean all exposed surfaces of base and adjoining areas of adhesive spatter before it sets.

END OF SECTION 09 65 13

SECTION 09 65 19 RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies the installation of luxury vinyl tile and accessories required for a complete installation.

1.3 SUBMITTALS:

- D. Samples:
 - 1. Manufacturer's standard selector kit for each type of tile specified.
- E. Manufacturer's data showing compliance with specifications.

1.4 DELIVERY:

- A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.
- B. Materials from containers which have been distorted, damaged or opened prior to installation are not acceptable.

1.5 STORAGE:

- A. Store materials in a clean, dry, enclosed space off the ground, protected from harmful weather conditions and at temperature and humidity conditions recommended by the manufacturer. Store flooring, adhesives, and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.

1.6 QUALITY ASSURANCE:

- A. Installer Qualifications: A company specializing in installation with minimum three (3) years' experience and employs experienced flooring installers who have retained, and currently hold, an International Standards and Training Alliance (INSTALL) Certification, or a certification from a comparable certification program.
- B. Furnish product type materials from the same production run.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

- A. Provide adhesives, underlayment, primers, and polish recommended by resilient floor material manufacturer.
- B. Critical Radiant Flux: 0.45 watts per sq. cm or more, Class I, per ASTM E648.
- C. Smoke Density: Less than 450 per ASTM E662.
- D. Slip Resistance – Not less than 0.5 when tested with ASTM D2047.

2.4 LUXURY VINYL TILE:

- A. Tile Standard: ASTM F1700, Class 3, Type B loose lay /glue down luxury vinyl tile
- B. Wearing Surface: Smooth.
- C. Thickness: 0.197 inch.

- D. Size: 9 x 48 inches.
- E. Colors to be selected from manufacturer's standard line.

2.7 ADHESIVES:

- A. Provide water resistant type adhesive for flooring as recommended by the manufacturer to suit substrate conditions. VOC content to be less than the 50 grams/L when calculated according to 40 CFR 59 (EPA Method 24).

2.8 POLISH AND CLEANERS:

- A. Cleaners: As recommended in writing by floor tile manufacturer.
- B. Polish: ASTM D4078.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS:

- A. Maintain flooring materials and areas to receive resilient flooring at a temperature above 68 degrees F for three (3) days before application, during application and two (2) days after application, unless otherwise directly by the flooring manufacturer for the flooring being installed. Maintain a minimum temperature of 55 degrees F thereafter. Provide adequate ventilation to remove moisture from area and to comply with regulations limiting concentrations of hazardous vapors.

3.2 SUBFLOOR TESTING AND PREPARATION:

- A. Prepare and test surfaces to receive resilient tile and adhesive as per Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.
 - 1. Flooring contractor to provide written acceptance of the existing and new floor slabs before beginning installation of floor finish.
- B. Prepare concrete substrates in accordance with ASTM F710.

3.3 INSTALLATION:

- A. Install in accordance with manufacturer's instructions for application and installation unless specified otherwise.
- B. Mix tile from at least two containers. An apparent line either of shades or pattern variance is not acceptable.
- C. Tile Layout:
 - 1. If layout is not shown on construction documents, lay tile symmetrically about center of room or space with joints aligned.
 - 2. Vary edge width as necessary to maintain full size tiles in the field, no edge tile to be less than 1/2 the field tile size, except where irregular shaped rooms make it impossible.
 - 3. Place tile pattern in the same direction; do not alternate tiles unless specifically indicated in the construction documents to the contrary.
- D. Application:
 - 1. Adhere floor tile to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
 - 2. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

3. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
 4. Roll tile floor with a minimum 45 kg (100 pound) roller.
- F. Installation of Edge Strips:
1. Locate edge strips under center line of doors unless otherwise shown on construction documents.
 2. Set resilient edge strips in adhesive. Anchor metal edge strips with anchors and screws.
 3. Where tile edge is exposed, butt edge strip to touch along tile edge.
 4. Where thin set ceramic tile abuts resilient tile, set edge strip against floor file and against the ceramic tile edge.

3.4 CLEANING AND PROTECTION:

- A. Clean adhesive marks on exposed surfaces during the application of resilient materials before the adhesive sets. Exposed adhesive is not acceptable.
- B. Keep traffic off resilient material for a minimum 72 hours after installation.
- C. Clean flooring as recommended in accordance with manufacturer's printed maintenance instructions and within the recommended time frame. As required by the manufacturer, apply the recommended number of coats and type of polish and/or finish in accordance with manufacturer's written instructions.
- D. When construction traffic occurs over tile, cover resilient materials with reinforced kraft paper properly secured and maintained until traffic is no longer an issue.
- E. When protective materials are removed and immediately prior to acceptance, replace damaged tile and mouldings, re-clean resilient materials.

3.5 LOCATION:

- A. Unless otherwise indicated in construction documents, install tile flooring in restroom, break area, closet, entrance, and corridor.

END OF SECTION 09 65 19

SECTION 09 68 00 BROADLOOM CARPET

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. Section specifies carpet, edge strips, adhesives, and other items required for complete installation.

1.2 RELATED WORK:

- A. Resilient Wall Base: Section 09 65 13, RESILIENT BASE.

1.3 QUALITY ASSURANCE:

- A. Installer Qualifications: A company specializing in carpet installation with a minimum three (3) years' experience and employing experienced flooring installers who have retained, and currently hold, an INSTALL Certification, or a certification from a comparable certification program, and a valid OSHA 10 certification.
 - 1. Installers to be certified by INSTALL or a comparable certification program with the following minimum criteria:
 - a. US Department of Labor approved four (4) year apprenticeship program, 160 hours a year.
 - b. Career long training.
 - c. Manufacturer endorsed training.

1.4 SUBMITTALS:

- A. Submit in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.
- B. Product Data:
 - 1. Manufacturer's catalog data and printed documentation stating physical characteristics, durability, resistance to fading and flame resistance characteristics for each type of carpet material and installation accessory.
 - 2. Manufacturer's printed installation instructions for the carpet, including preparation of installation substrate, seaming techniques and recommended adhesives and tapes.
- C. Samples:
 - 1. Carpet: Manufacturer's selector books.
 - 2. Floor Edge Strip 6 inches long of each color and type specified.
- D. Shop Drawings: Installers layout plan showing seams and cuts for sheet carpet and carpet module.
- E. Maintenance Data: Carpet manufacturer's maintenance instructions describing recommended type of cleaning equipment and material, spotting and cleaning methods and cleaning cycles.
- F. Installer's Qualifications.
- G. Manufacturer's warranty.

1.5 DELIVERY AND STORAGE:

- A. Deliver carpet in manufacturer's original wrappings and packages clearly labeled with manufacturer's brand name, size, dye lot number and related information. Transport carpet to job site in a manner that prevents damage and distortion that might render it unusable. When bending or folding is unavoidable for delivery purposes, unfold carpet and lay flat immediately.

- B. Deliver adhesives in containers clearly labeled with manufacturer's brand name, number, installation instructions, safety instructions and flash points.
- C. Store in a clean, dry, well-ventilated area, protected from damage and soiling. Before installation, acclimate carpet to the atmospheric conditions of the areas in which it will be installed for 2 days prior to installation

1.6 ENVIRONMENTAL REQUIREMENTS:

- A. Maintain areas in which carpeting is to be installed at a temperature between 65 - 95 degrees F with a maximum relative humidity of 65 percent for two (2) days before installation, during installation and for three (3) days after installation.
- B. Minimum Substrate Surface Temperature: 65 degrees F at time of installation.
- C. Three (3) days after installation, maintain minimum temperature of 50 degrees F for the duration of the contract.

1.7 WARRANTY:

- A. Manufacturer Warranty: Manufacturer shall warranty their carpet for a minimum of ten (10) years from date of installation and final acceptance by the Government. Submit manufacturer warranty.

1.8 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American National Standards Institute (ANSI):
ANSI/NSF 140-10 Sustainable Carpet Assessment Standard
- C. American Association of Textile Chemists and Colorists (AATCC):
16-04 Colorfastness to Light
134-11 Electric Static Propensity of Carpets
165-08 Colorfastness to Crocking: Textile Floor Coverings-AATCC
Crockmeter Method
174-11 Antimicrobial Activity Assessment of New Carpets
- D. ASTM International (ASTM):
D1335-12 Tuft Bind of Pile Yarn Floor Coverings
D3278-96(R2011) Flash Point of Liquids by Small Scale Closed-Cup Apparatus
D5116-10 Determinations of Organic Emissions from Indoor Materials/Products
D5252-11 Operation of the Hexapod Tumble Drum Tester
D5417-11 Operation of the Vettermann Drum Tester
E648-14c Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
- E. The Carpet and Rug Institute (CRI):
CIS Carpet Installation Standard
- F. International Standards and Training Alliance (INSTALL)
- G. U.S. Consumer Product and Safety Commission (CPSC):
16 CFR 1630 Surface Flammability of Carpets and Rugs

PART 2 - PRODUCTS

2.1 CARPET:

A. Physical Characteristics:

1. Carpet free of visual blemishes, streaks, poorly dyed areas, fuzzing of pile yarn, spots or stains and other physical and manufacturing defects.
2. Type:
 - a. Carpet Construction: Woven.
 - b. Carpet Type: Broadloom, 6 feet minimum usable carpet width with 0.15 percent growth/shrink rate in accordance with ISO 2551.
 - c. Pile Type: Level-loop. Pile type and thickness must conform to ADA requirements.
 - d. Pile Fiber: Commercial 100 percent branded (federally registered trademark), nylon continuous filament.
3. Static Control: Provide static control to permanently regulate static buildup to less than 3.5 kV when tested at 20 percent relative humidity and 21 degrees C (70 degrees F) in accordance with AATCC 134.
4. Backing Materials: Provide backing for glue-down installation.
 - a. Broadloom:
 - 1) Primary Backing: Manufacturer's standard material; Nonwoven, polypropylene or polyester.
 - 2) Secondary Backing: Manufacturer's standard material; Nonwoven, polypropylene or polyester.
 - 3) Backcoating: Manufacturer's standard material; PVC.
5. Appearance Retention Rating (ARR): Carpet to be tested and have the minimum 3.5 – 4.0 severe ARR when tested in accordance with either the ASTM D5252 (Hexapod) or ASTM D5417 (Vettermann) test methods using the number of cycles for short and long term tests as specified in the ASTM standard.
6. Tuft Bind: Comply with ASTM D1335 for tuft bind force required to pull a tuft or loop free from carpet backing with a minimum 40 N (9 pound) average force for loop pile broadloom.
7. Colorfastness to Crocking: Dry and wet crocking and water bleed, comply with AATCC 165 Color Transference Chart for colors, minimum class 4 rating.
8. Colorfastness to Light (AATCC 16, Option 3): Color change between the exposed and unexposed carpet areas equivalent to a minimum of Grade 4 on the Gray Scale for Color Change after an exposure of 40 AFU (AATCC fading units) for all specified colors.
9. Delamination Strength: Minimum of 440 N/m (2.5 lb./inch) between secondary backing.
10. Flammability and Critical Radiant Flux Requirements:
 - a. Comply with 16 CFR 1630.
 - b. Test Carpet in accordance with ASTM E648.
 - c. Class I: Minimum critical radiant flux of 0.45 watts per square centimeter (2.9 watts per square inch).
11. Average Pile Yarn Density (APYD):
 - a. Minimum APYD 6000.

2.2 ADHESIVE AND CONCRETE PRIMER:

- A. Provide water resistant, mildew resistant, nonflammable, and non-staining adhesives and concrete primers for carpet installation. Provide release adhesive for modular tile carpet as recommended by the carpet manufacturer. Provide adhesives flashpoint of minimum 60 degrees C (140 degrees F) in accordance with ASTM D3278.

2.3 SEAMING TAPE:

- A. Provide tape for seams as recommended by the carpet manufacturer for the type of seam used in installation.

2.4 EDGE STRIPS:

- A. Vinyl Edge Strip:
 - 1. Beveled floor flange minimum 2 inches wide.
 - 2. Beveled surface to finish flush with carpet for tight joint and other side to floor finish.
 - 3. Color to be selected from manufacturer's standard line.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION:

- A. Contractor to prepare and test surfaces to receive carpet and adhesives as per Section 09 05 16, SUBSURFACE PREPARATION FOR FLOOR FINISHES.

3.2 GENERAL INSTALLATION:

- A. Isolate area of installation from rest of building.
- B. Perform all work by manufacturer's approved installers. Conduct installation in accordance with the manufacturer's printed instructions and CRI CIS.
- C. Protect edges of carpet meeting hard surface flooring with molding and install in accordance with the molding manufacturer's printed instructions.
- D. Follow ventilation, personal protection, and other safety precautions recommended by the adhesive manufacturer. Continue ventilation during installation and for at least three (3) days following installation.
- E. Do not permit traffic or movement of furniture or equipment in carpeted area for 24 hours after installation.
- F. Complete other work which would damage the carpet prior to installation of carpet.
- G. Follow carpet manufacturer's recommendations for matching pattern and texture directions.
- H. Cut openings in carpet where required for installing equipment, pipes, outlets, and penetrations. Bind or seal cut edge of sheet carpet. Use additional adhesive to secure carpets around pipes and other vertical projections.

3.3 BROADLOOM CARPET INSTALLATION:

- A. Install broadloom carpet direct glue down smooth, uniform, and secure, with a minimum of seams.
- B. Apply regular, unnoticeable, and treated seams with a seam adhesive. Run side seams toward the light, where practical, and where such layout does not increase the number of seams. Install breadths parallel, with carpet pile in the same directions.
- C. Match patterns accurately. Neatly cut and fit cutouts, at door jambs, columns and ducts securely.

- D. Locate seams at doorways parallel to and centered directly under doors. Do not make seams perpendicular to doors or at pivot points.
- E. Provide seams at changes in directions of corridors to follow the wall line parallel to the carpet direction. Lay the carpet lengthwise down the corridors with widths less than 1.82 m (6 feet).

3.4 EDGE STRIPS INSTALLATION

- A. Install edge strips over exposed carpet edges adjacent to uncarpeted finish flooring.
- B. Anchor metal strips to floor with suitable fasteners. Apply adhesive to edge strips, insert carpet into lip and press it down over carpet.
- C. Anchor vinyl edge strip to floor with adhesive. Apply adhesive to edge strip and insert carpet into lip and press lip down over carpet.

3.5 PROTECTION AND CLEANING:

- A. Once a carpet installation is complete, clean up scrap materials and debris, and vacuum the area, using manufacturer-approved equipment. Inspect seams carefully for evenness and protruding backing yarns, and inspect the perimeter of the installation for an acceptable finished appearance.
- B. Protect installed carpet if furniture is being moved, by laying plywood, fiberboard or porous non-staining sheeting material for minimum time practical. Based on manufacturer guidelines, protect carpet from rolling or foot traffic. Protect against other materials or renovation or construction activities, including dust, debris, paint, contractor traffic, until it is ready for its final use.
- C. Do not move furniture or equipment on unprotected carpeted surfaces.
- D. Just before final acceptance of work, remove protection and vacuum carpet clean.

END OF SECTION 09 68 00

SECTION 09 91 00 PAINTING

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the painting and finishing as shown on the construction documents and/or specified herein, including, but not limited to, the following:
1. Prime coats which may be applied in shop under other sections.
 2. Prime painting unprimed surfaces to be painted under this Section.
 3. Painting items furnished with a prime coat of paint, including touching up of or repairing of abraded, damaged or rusted prime coats applied by others.
 4. Painting ferrous metal (except stainless steel) exposed to view.
 5. Painting galvanized ferrous metals exposed to view.
 6. Painting gypsum drywall exposed to view.
 7. Painting of wood exposed to view, except items which are specified to be painted or finished under other Sections of these specifications. Back painting of all wood in contact with concrete, masonry or other moisture areas.
 8. Painting pipes, pipe coverings, conduit, ducts, insulation, hangers, supports and other mechanical and electrical items and equipment exposed to view.
 9. Painting surfaces above, behind or below grilles, gratings, diffusers, louvers lighting fixtures, and the like, which are exposed to view through these items.
 10. Painting includes shellacs, stains, varnishes, coatings specified, and striping or markers and identity markings.
 11. Incidental painting and touching up as required to produce proper finish for painted surfaces, including touching up of factory finished items.
 12. Painting of any surface not specifically mentioned to be painted herein or on construction documents, but for which painting is obviously necessary to complete the job, or work which comes within the intent of these specifications, is to be included as though specified.

1.2 SUBMITTALS:

- A. Submit in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.
- B. Manufacturer's Literature and Data:
1. Before work is started, or sample panels are prepared, submit manufacturer's literature and technical data, the current Master Painters Institute (MPI) "Approved Product List" indicating brand label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use subsequent MPI "Approved Product List", however, only one (1) list may be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI "Approved Product List" where applicable is acceptable.
- C. Manufacturers' Certificates indicating compliance with specified requirements:

1.3 DELIVERY AND STORAGE:

- A. Deliver materials to site in manufacturer's sealed container marked to show following:

1. Name of manufacturer.
 2. Product type.
 3. Batch number.
 4. Instructions for use.
 5. Safety precautions.
- B. Maintain space for storage, and handling of painting materials and equipment in a ventilated, neat and orderly condition to prevent spontaneous combustion from occurring or igniting adjacent items.
- C. Store materials at site at least 24 hours before using, at a temperature between 7 and 30 degrees C (45 and 85 degrees F).

1.4 QUALITY ASSURANCE:

- A. Qualification of Painters: Use only qualified journeyman painters for the mixing and application of paint on exposed surfaces. Submit evidence that key personnel have successfully performed surface preparation and application of coating on a minimum of three (3) similar projects within the past three (3) years.
- B. Paint Coordination: Provide finish coats which are compatible with the prime paints used. Review other Sections of these specifications in which prime paints are to be provided to ensure compatibility of the total coatings system for the various substrates. Upon request from other subcontractors, furnish information on the characteristics of the finish materials proposed to be used, to ensure that compatible prime coats are used. Provide barrier coats over incompatible primers or remove and re-prime as required.

1.5 REGULATORY REQUIREMENTS:

- A. Paint materials are to conform to the restrictions of the local Environmental and Toxic Control jurisdiction.
1. Volatile Organic Compounds (VOC) Emissions Requirements: Field-applied paints and coatings that are inside the waterproofing system to not exceed limits of authorities having jurisdiction.
 2. Lead-Base Paint: Provide materials that do not contain lead.
 3. Asbestos: Provide materials that do not contain asbestos.
 4. Chromate, Cadmium, Mercury, and Silica: Provide materials that do not contain zinc-chromate, strontium-chromate, Cadmium, mercury or mercury compounds or free crystalline silica.
 5. Human Carcinogens: Provide materials that do not contain any of the ACGIH-BKLT and ACGIH-DOC confirmed or suspected human carcinogens.
 6. Use high performance acrylic paints in place of alkyd paints.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Conform to the coating specifications and standards referenced in PART 3. Submit manufacturer's technical data sheets for specified coatings and solvents.

2.2 PAINT PROPERTIES:

- A. Use ready-mixed (including colors), except two component epoxies, polyurethanes, polyesters, paints having metallic powders packaged separately and paints requiring specified additives.
- B. Where no requirements are given in the referenced specifications for primers, use primers with pigment and vehicle, compatible with substrate and finish coats specified.

- C. Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer, and use only to recommended limits.

PART 3 - EXECUTION

3.1 JOB CONDITIONS:

- A. Safety: Observe required safety regulations and manufacturer's warning and instructions for storage, handling and application of painting materials.
 - 1. Take necessary precautions to protect personnel and property from hazards due to falls, injuries, toxic fumes, fire, explosion, or other harm.
 - 2. Deposit soiled cleaning rags and waste materials in metal containers approved for that purpose. Dispose of such items off the site at end of each day's work.
- B. Atmospheric and Surface Conditions:
 - 1. Do not apply coating when air or substrate conditions are:
 - a. Less than 3 degrees C (5 degrees F) above dew point.
 - b. Below 10 degrees C (50 degrees F) or over 35 degrees C (95 degrees F), unless specifically pre-approved by the COR and the product manufacturer. Under no circumstances are application conditions to exceed manufacturer recommendations.
 - c. When the relative humidity exceeds 85 percent; or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instructions.
 - 2. Maintain interior temperatures until paint dries hard.
 - 3. Do no exterior painting when it is windy and dusty.
 - 4. Do not paint in direct sunlight or on surfaces that the sun will warm.
 - 5. Apply only on clean, dry and frost free surfaces except as follows:
 - a. Apply water thinned acrylic and cementitious paints to damp (not wet) surfaces only when allowed by manufacturer's printed instructions.
 - b. Concrete and masonry when permitted by manufacturer's recommendations, dampen surfaces to which water thinned acrylic and cementitious paints are applied with a fine mist of water on hot dry days to prevent excessive suction and to cool surface.
 - 6. Varnishing:
 - a. Apply in clean areas and in still air.
 - b. Before varnishing vacuum and dust area.
 - c. Immediately before varnishing wipe down surfaces with a tack rag.

3.2 INSPECTION:

- A. Examine the areas and conditions where painting and finishing are to be applied and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.3 GENERAL WORKMANSHIP REQUIREMENTS:

- A. Application may be by brush or roller. Spray application only with written approval from the Architect.
- B. Protect work at all times. Protect all adjacent work and materials by suitable covering or other method during progress of work. Upon completion of the work, remove all paint and varnish spots from floors, glass and other surfaces. Remove from the premises all rubbish and accumulated materials of whatever nature not caused by others and leave work in a clean condition.

- C. Remove and protect hardware, accessories, device plates, lighting fixtures, and factory finished work, and similar items, or provide in place protection. Upon completion of each space, carefully replace all removed items by workmen skilled in the trades involved.
- D. When indicated to be painted, remove electrical panel box covers and doors before painting walls. Paint separately and re-install after all paint is dry.
- E. Materials are to be applied under adequate illumination, evenly spread and flowed on smoothly to avoid runs, sags, holidays, brush marks, air bubbles and excessive roller stipple.
- F. Apply materials with a coverage to hide substrate completely. When color, stain, dirt or undercoats show through final coat of paint, the surface is to be covered by additional coats until the paint film is of uniform finish, color, appearance and coverage, at no additional cost to the Government.
- G. All coats are to be dry to manufacturer's recommendations before applying succeeding coats.
- H. All suction spots or "hot spots" in plaster after the application of the first coat are to be touched up before applying the second coat.
- I. Do not apply paint behind frameless mirrors that use mastic for adhering to wall surface.

3.4 SURFACE PREPARATION:

A. General:

- 1. The Contractor shall be held wholly responsible for the finished appearance and satisfactory completion of painting work. Properly prepare all surfaces to receive paint, which includes cleaning, sanding, and touching-up of all prime coats applied under other Sections of the work. Broom clean all spaces before painting is started. All surfaces to be painted or finished are to be completely dry, clean and smooth.
- 2. See other sections of specifications for specified surface conditions and prime coat.
- 3. Perform preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified, for each particular substrate condition.
- 4. Clean surfaces before applying paint or surface treatments with materials and methods compatible with substrate and specified finish. Remove any residue remaining from cleaning agents used. Do not use solvents, acid, or steam on concrete and masonry. Schedule the cleaning and painting so that dust and other contaminants from the cleaning process will not fall in wet, newly painted surfaces.
- 5. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - a. Concrete: 12 percent.
 - b. Fiber-Cement Board: 12 percent.
 - d. Wood: 15 percent.
 - e. Gypsum Board: 12 percent.

B. Wood:

- 1. Sand to a smooth even surface and then dust off.
- 2. Sand surfaces showing raised grain smooth between each coat.
- 3. Wipe surface with a tack rag prior to applying finish.
- 4. Surface painted with an opaque finish:
 - a. Coat knots, sap and pitch streaks with MPI 36 (Knot Sealer) before applying paint.
 - b. Apply two coats of MPI 36 (Knot Sealer) over large knots.

5. After application of prime or first coat of stain, fill cracks, nail and screw holes, depressions and similar defects with wood filler paste. Sand the surface to make smooth and finish flush with adjacent surface.
 6. Before applying finish coat, reapply wood filler paste if required, and sand surface to remove surface blemishes. Finish flush with adjacent surfaces.
 7. Fill open grained wood such as oak, walnut, ash and mahogany with MPI 91 (Wood Filler Paste), colored to match wood color.
 - a. Thin filler in accordance with manufacturer's instructions for application.
 - b. Remove excess filler, wipe as clean as possible, dry, and sand as specified.
- C. Ferrous Metals:
1. Remove oil, grease, soil, drawing and cutting compounds, flux and other detrimental foreign matter in accordance with SSPC-SP 1 (Solvent Cleaning).
 2. Remove loose mill scale, rust, and paint, by hand or power tool cleaning, as defined in SSPC-SP 2 (Hand Tool Cleaning) and SSPC-SP 3 (Power Tool Cleaning).
 3. Fill dents, holes and similar voids and depressions in flat exposed surfaces of hollow steel doors and frames, access panels, roll-up steel doors and similar items specified to have semi-gloss or gloss finish with TT-F-322D (Filler, Two-Component Type, For Dents, Small Holes and Blow-Holes). Finish flush with adjacent surfaces.
 - a. Fill flat head countersunk screws used for permanent anchors.
 - b. Do not fill screws of item intended for removal such as glazing beads.
 4. Spot prime abraded and damaged areas in shop prime coat which expose bare metal with same type of paint used for prime coat. Feather edge of spot prime to produce smooth finish coat.
 5. Spot prime abraded and damaged areas which expose bare metal of factory finished items with paint as recommended by manufacturer of item.
- D. Gypsum Board:
1. Remove efflorescence, loose and chalking plaster or finishing materials.
 2. Remove dust, dirt, and other deterrents to paint adhesion.
 3. Fill holes, cracks, and other depressions with CID-A-A-1272A finished flush with adjacent surface, with texture to match texture of adjacent surface. Patch holes over 25 mm (1-inch) in diameter as specified in Section for plaster or gypsum board.

3.5 PAINT PREPARATION:

- A. Thoroughly mix painting materials to ensure uniformity of color, complete dispersion of pigment and uniform composition.
- B. Do not thin unless necessary for application and when finish paint is used for body and prime coats. Use materials and quantities for thinning as specified in manufacturer's printed instructions.
- C. Remove paint skins, then strain paint through commercial paint strainer to remove lumps and other particles.
- D. Mix two (2) component and two (2) part paint and those requiring additives in such a manner as to uniformly blend as specified in manufacturer's printed instructions unless specified otherwise.
- E. For tinting required to produce exact shades specified, use color pigment recommended by the paint manufacturer.

3.6 APPLICATION:

- A. Start of surface preparation or painting will be construed as acceptance of the surface as satisfactory for the application of materials.

- B. Unless otherwise specified, apply paint in three (3) coats; prime, body, and finish. When two (2) coats applied to prime coat are the same, first coat applied over primer is body coat and second coat is finish coat.
- C. Apply each coat evenly and cover substrate completely.
- D. Allow not less than 48 hours between application of succeeding coats, except as allowed by manufacturer's printed instructions, and approved by COR.
- E. Apply by brush or roller. Spray application for new or existing occupied spaces only upon approval by acceptance from COR in writing.
 - 1. Apply painting materials specifically required by manufacturer to be applied by spraying.
 - 2. In new construction and in existing occupied spaces, where paint is applied by spray, mask or enclose with polyethylene, or similar air tight material with edges and seams continuously sealed including items specified in "Building and Structural Work Field Painting"; "Work not Painted"; motors, controls, telephone, and electrical equipment, fronts of sterilizes and other recessed equipment and similar prefinished items.
- F. Do not paint in closed position operable items such as access doors and panels, window sashes, overhead doors, and similar items except overhead roll-up doors and shutters.

3.7 PRIME PAINTING:

- A. After surface preparation, prime surfaces before application of body and finish coats, except as otherwise specified.
- B. Spot prime and apply body coat to damaged and abraded painted surfaces before applying succeeding coats.
- C. Additional field applied prime coats over shop or factory applied prime coats are not required except for exterior exposed steel apply an additional prime coat.
- D. Prime rabbets for stop and face glazing of wood, and for face glazing of steel.
- E. Wood and Wood Particleboard:
 - 1. Use same kind of primer specified for exposed face surface.
 - a. Exterior wood: MPI 7 (Exterior Oil Wood Primer) for new construction and MPI 5(Exterior Alkyd Wood Primer) for repainting bare wood primer except where MPI 90 (Interior Wood Stain, Semi-Transparent) is scheduled.
 - b. Interior wood except for transparent finish: MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat), thinned if recommended by manufacturer.
 - 2. Apply two (2) coats of primer MPI 7 (Exterior Oil Wood Primer) or MPI 5 (Exterior Alkyd Wood Primer) or sealer MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat) to surfaces of wood doors, including top and bottom edges, which are cut for fitting or for other reason.
 - 3. Apply one (1) coat of primer MPI 7 (Exterior Oil Wood Primer) or MPI 5 (Exterior Alkyd Wood Primer) or sealer MPI 45 (Interior Primer Sealer) or MPI 46 (Interior Enamel Undercoat) as soon as delivered to site to surfaces of unfinished woodwork, except concealed surfaces of shop fabricated or assembled millwork and surfaces specified to have varnish, stain or natural finish.
 - 4. Back prime and seal ends of exterior woodwork, and edges of exterior plywood specified to be finished.
 - 5. Apply MPI 67 (Interior Latex Fire Retardant, Top-Coat (UL Approved) to wood for fire retardant finish.
- F. Metals except boilers, incinerator stacks, and engine exhaust pipes:
 - 1. Steel and iron: MPI 95 (Fast Drying Metal Primer).

G. Gypsum Board:

1. Surfaces scheduled to have MPI 52 (Interior Latex, MPI Gloss Level 3) finish: Use MPI 53 (Interior Latex, MPI Gloss Level 3).
2. Primer: MPI 50 (Interior Latex Primer Sealer) except use MPI 46 (Interior Enamel Undercoat) on wet walls in restrooms and janitor/housekeeping closets behind and adjacent to mop sink and water heater.

3.8 EXTERIOR FINISHES:

A. Wood:

1. Do not apply finish coats on surfaces concealed after installation, top and bottom edges of wood doors and sash, or on edges of wood framed insect screens.
2. Two (2) coats of MPI 11 (Exterior Latex, Semi-Gloss).

3.9 INTERIOR FINISHES:

C. Gypsum Board:

1. One (1) coat of MPI 45 (Interior Primer Sealer) plus two (2) coats of MPI 139 (Interior High Performance Latex, MPI Gloss level 3).

3.10 PAINT COLOR:

- A. Paint colors will be selected from the manufacturer's standard line through the submittal review process.

3.11 PROTECTION CLEAN UP, AND TOUCH-UP:

- A. Protect work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.
- B. Upon completion, clean paint from hardware, glass and other surfaces and items not required to be painted, of paint drops or smears.
- C. Before final inspection, touch-up or refinished in a manner to produce solid even color and finish texture, free from defects in work which was damaged or discolored.

END OF SECTION 09 91 00

SECTION 10 26 00 CORNER GUARDS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies corner guards installed on existing gypsum board and metal stud partitions.

1.3 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Manufacturer with a minimum of three (3) years' experience in providing items of type specified.
 - 1. Obtain corner guards from single manufacturer.
- B. Installer's Qualifications: Installers are to have a minimum of three (3) years' experience in the installation of units required for this project.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 00, SUBMITTAL PROCEDURES.
- B. Shop Drawings: Show design and installation details.
- C. Manufacturer's Literature and Data:
- D. Test Report: Showing that resilient material complies with specified fire and safety code requirements.
- G. Manufacturer's warranty.
- H. Manufacturer's color selector samples (printed color chart will not be acceptable).
- I. Sample showing corner guard, mounting bracket and fastening method.

1.5 DELIVERY AND STORAGE

- A. Deliver materials to the site in original sealed packages or containers marked with the name and brand, or trademark of the manufacturer.
- B. Protect from damage from handling and construction operations before, during and after installation.
- C. Store in a dry environment of approximately 70 degrees F for at least 48 hours prior to installation.

1.6 WARRANTY

- A. Manufacturer Warranty: Minimum of five (5) years from date of installation and final acceptance by the Owner.

1.7 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. ASTM International (ASTM):
 - A240/A240M-14Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and For General Applications
 - B221-14.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
 - B221M-13.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes (Metric)

- D256-10 Impact Resistance of Plastics
- D635-10 Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position
- E84-14..... Surface Burning Characteristics of Building Materials
- C. Aluminum Association (AA):
 - DAF 45-09..... Designation System for Aluminum Finishes
- D. American Architectural Manufacturers Association (AAMA):
 - 611-14 Anodized Architectural Aluminum
- E. Code of Federal Regulation (CFR):
 - 40 CFR 59..... Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coating

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: A240/A240M, Type 304.
- B. Aluminum Extruded: ASTM B221M (B221), Alloy 6063, Temper T5 or T6.
- C. Resilient Material:
 - 1. Provide resilient material consisting of high impact resistant extruded acrylic vinyl, polyvinyl chloride, or injection molded thermal plastic conforming to the following:
 - a. Minimum impact resistance of 18 ft.-lbs./sq. inch when tested in accordance with ASTM D256 (Izod impact, ft.-lbs. per inch notched).
 - b. Class 1 fire rating when tested in accordance with ASTM E84, having a maximum flame spread of 25 and a smoke developed rating of 450 or less.
 - c. Rated self-extinguishing when tested in accordance with ASTM D635.
 - d. Provide material labeled and tested by Underwriters Laboratories or other approved independent testing laboratory.
 - e. Provide integral color with colored components matched in accordance with SAE J 1545 to within plus or minus 1.0 on the CIE-LCH scales.

2.2 CORNER GUARDS

- A. Resilient, Shock-Absorbing Corner Guards: Surface mounted type.
 - 1. Snap-on corner guard formed from resilient material, minimum 0.078-inch thick, free floating on a continuous 0.060-inch thick extruded aluminum retainer.
 - 2. Profile: Minimum 3 inch long leg and 1/4 inch corner radius.
 - 3. Height: 4 feet.
 - 4. Retainer Clips: Provide manufacturer's standard impact-absorbing clips.
 - 5. Provide factory fabricated end closure caps at top and bottom of surface mounted corner guards.

2.3 FASTENERS AND ANCHORS

- A. Provide fasteners and anchors as required for each specific type of installation.
- B. Where type, size, spacing or method of fastening is not shown or specified in construction documents, submit shop drawings showing proposed installation details.

2.4 FINISH

- A. Resilient Material: Embossed textures and color in accordance with SAE J1545.
- B. Color(s) will be selected from the manufacturer's standard line through the submittal review process.

PART 3 - INSTALLATION

3.1 RESILIENT CORNER GUARDS

- A. Install corner guards on walls in accordance with manufacturer's instructions.

END OF SECTION 10 26 00

SECTION 10 28 00 RESTROOM ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Section Includes: Restroom and shower accessories.
- B. Soap dispensers, paper towel dispensers, hand sanitizer dispensers and toilet paper dispensers will be provided by the Owner's restroom supplies vendor. Contractor is responsible for providing solid wood blocking.
- C. Trash receptacles will be provided by Owner.
- D. All accessories are to be mounted in accordance with the International Building Code and the International Code Council A117.1, requirements for accessibility.

1.2 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American Society of Mechanical Engineers (ASME):
 - 1. B18.6.4-98(R2005) - Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws inch.
- C. American Welding Society (AWS):
 - 1. D10.4-86(2000) - Welding Austenitic Chromium-Nickle Stainless Steel Piping and Tubing.
- D. ASTM International (ASTM):
 - 1. A269/A269M-15 - Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - 2. A312/A312M-15b - Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
 - 3. A653/A653M-15 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 4. A666-15 - Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - 5. A1011/A1011M-14 - Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
 - 6. B30-14a - Copper Alloys in Ingot Form.
 - 7. B75/B75M-11 - Seamless Copper Tube.
 - 8. B221-14 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 9. B221M-13 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
 - 10. B456-11e1 - Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
 - 11. B824-14 - General Requirements for Copper Alloy Castings.
 - 12. C1036-11e1 - Flat Glass.
 - 13. C1048-12e1 - Heat-Strengthened and Fully Tempered Flat Glass.
 - 14. D635-14 - Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.

15. F446-85(2009) - Grab Bars and Accessories Installed in the Bathing Area.

E. National Architectural Metal Manufacturers(NAAMM):

1. AMP 500-06 - Metal Finishes Manual.

1.3 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:

1. Show size, configuration, and fabrication, anchorage and installation details.

2. Show mounting locations and heights.

C. Manufacturer's Literature and Data:

1. Description of each product.

2. Installation instructions.

D. Certificates: Certify each product complies with specifications.

1. Soap dispensers: Certify soap dispensers are fabricated of material that will not be affected by liquid soap, aseptic detergents, and hexachlorophene solutions.

E. Operation and Maintenance Data:

1. Care instructions for each exposed finish product.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Regularly manufactures specified products.

1.5 DELIVERY

A. Deliver products in manufacturer's original sealed packaging.

B. Mark packaging, legibly. Indicate manufacturer's name or brand, // color, // production run number, and manufacture date.

C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.6 STORAGE AND HANDLING

A. Store products indoors in dry, weathertight facility.

B. Protect products from damage during handling and construction operations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum: ASTM B221M (ASTM B221), Alloy 6063-T5 and Alloy 6463-T5.

B. Stainless Steel:

1. Plate Or Sheet: ASTM A666, Type 304, 0.031 inch thick unless otherwise specified.

2. Tubing: ASTM A269/A269M, Grade TP 304, seamless or welded.

3. Pipe: ASTM A312/A312M; Grade TP 304.

C. Steel Sheet: ASTM A653/A653M, zinc-coated (galvanized) coating designation G90.

- D. Chrome Plating (Service Condition Number SC 2): ASTM B456.
- E. Brass Castings: ASTM B30.
- F. Copper:
 - 1. Tubing: ASTM B75/B75M.
 - 2. Castings: ASTM B824.
- G. Glass:
 - 1. ASTM C1036, Type 1, Class 1, Quality q2, for mirrors.

2.2 PRODUCTS - GENERAL

- A. Provide each product from one manufacturer.
- B. Provide products equal to or better than those specified on the drawings as basis of design.

2.3 FABRICATION - GENERAL

- A. Welding, AWS D10.4.
- B. Grind, dress, and finish welded joints to match finish of adjacent surface.
- C. Form exposed surfaces from one sheet of stock, free of joints.
- D. Provide steel anchors and components required for secure installation.
- E. Form flat surfaces without distortion. Keep exposed surfaces free from scratches and dents. Reinforce doors to prevent warp or twist.
- F. Isolate aluminum from dissimilar metals and from contact with building materials as required to prevent electrolysis and corrosion.
- G. Hot-dip galvanized steel or stainless steel, anchors and fastening devices.
- H. Shop assemble accessories and package with components, anchors, fittings, fasteners and keys.
- I. Key items alike.
- J. Provide templates and rough-in measurements.
- K. Round and deburr edges of sheets to remove sharp edges.

2.4 FINISH

- A. Steel Paint Finish:
 - 1. Powder-Coat Finish: Manufacturer's standard two-coat finish system consisting of the following:
 - a. One coat primer.
 - b. One coat thermosetting topcoat.
 - c. Dry-film Thickness: 2 mils minimum.
- B. Nylon Coated Steel: Nylon coating powder formulated for fluidized bonding process to steel to provide hard smooth, medium gloss finish, minimum 0.012 inch thick, rated as self-extinguishing when tested according to ASTM D635.
- C. Stainless Steel: NAAMM AMP 500; No. 4 polished finish.
- D. Aluminum Anodized Finish: NAAMM AMP 500.
 - 1. Clear Anodized Finish: AA-C22A41; Class I Architectural, 0.7 mil thick.
 - 2. Color Anodized Finish: AA-C22A42 or AA-C22A44; Class I Architectural, 0.7 mil thick.
- E. Chromium Plating: ASTM B456, satin or bright as specified, Service Condition No. SC2.

2.5 ACCESSORIES

- A. Fasteners:
 - 1. Exposed Fasteners: Stainless steel or chromium plated brass, finish to match adjacent surface.
 - 2. Concealed Fasteners:
 - a. Shower, Bath Tubs, and High Moisture Areas: Stainless steel.
 - b. Other Locations: Steel, hot-dipped galvanized.
 - 3. Toggle Bolts: For use in hollow masonry or frame construction.
 - 4. Sex bolts: For through bolting on thin panels.
 - 5. Expansion Shields: Lead or plastic for solid masonry and concrete substrate as recommended by accessory manufacturer to suit application.
 - 6. Screws:
 - a. ASME B18.6.4.
 - b. Fed. Spec. FF-S-107, Stainless steel Type A.
- B. Adhesive: As recommended by manufacturer to suit application.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
 - 1. Verify blocking to support accessories is installed and located correctly.
- B. Verify location of accessories with Architect.

3.2 INSTALLATION

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Architect consideration.
- B. Install grab bars according to ASTM F446.
- C. Set work accurately, in alignment and where indicated, parallel or perpendicular as required to line and plane of surface. Install accessories plumb, level, free of rack and twist.
- D. Toggle bolt to steel anchorage plates in frame partitions and hollow masonry.
- E. Install accessories to function as designed. Perform maintenance service without interference with performance of other devices.
- F. Position and install dispensers, and other devices in countertops, clear of drawers, permitting ample clearance below countertop between devices, and ready access for maintenance.
- G. Align mirrors, dispensers and other accessories even and level, when installed in battery.
- H. Install accessories to prevent striking by other moving, items or interference with accessibility.

3.3 CLEANING

- A. After installation, clean toilet accessories according to manufacturer's instructions.

3.4 PROTECTION

- A. Protect accessories from damage until project completion.

3.5 SCHEDULE OF ACCESSORIES

- A. Schedule is provided in Drawings.

END OF SECTION 10 28 00

SECTION 31 25 00 EROSION AND SEDIMENT CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. South Carolina Department of Transportation Standard Specifications, 2007 edition.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Special Provisions and Division 31 Specification Sections, apply to this Section.
- C. The Comprehensive Storm Water Pollution and Prevention Plan (C-SWPPP) and Onsite Storm Water Pollution and Prevention Plan (OS-SWPPP) in effect for this project. The Contractor and each sub-contractor is required to attend a mandatory preconstruction conference at which time they will be documented as having been present for the conference and thereby certified as having attended the conference in conformance with the OS-SWPPP requirements.
- D. South Carolina DHEC Storm Water Management BMP Handbook, latest edition for Best Management Practices (BMPs)

1.2 SUMMARY

- A. Section includes:
 - 1. The work specified in this Section consists of providing and maintaining temporary and permanent erosion and sedimentation controls as shown on the Drawings. This Section also specifies the subsequent removal of temporary erosion and sedimentation controls.
- B. Temporary and permanent erosion and sedimentation controls include grassing and mulching of disturbed areas and structural barriers at those locations which will ensure that erosion during construction will be maintained within acceptable limits. Acceptable limits are as established by the South Carolina Erosion and Sedimentation Control Act of 1975, as amended through 1995, Section 402 of the Federal Clean Water Act, and applicable codes, ordinances, rules, regulations and laws of local and municipal authorities having jurisdiction.
- C. Temporary and permanent erosion and sedimentation controls include grassing and mulching of disturbed areas and structural barriers and all other Best Management Practices (BMPs) required by this Contract shall be installed in compliance with SCDOT Standard Specifications, including SC-M-810, 815-1, 815-2, 815-4, 815-5, 815-6, 815-7 and 815-10.
- D. Related Sections:
 - 1. Section 321723.13 - Permanent Pavement Markings-Paint
 - 2. Section 321600 - Concrete Sidewalk, Curbing & Driveways
 - 3. Section 329219 - Seeding

1.3 SUBMITTALS

- A. Product Data: Submit product data in accordance with the requirements of these Specifications.
- B. Samples for Verification:
 - 1. Prior to any construction activity, the Contractor shall submit, for the Engineer's approval, a schedule for the accomplishment of temporary and permanent erosion and sedimentation control work. No work shall be started until the erosion and sedimentation control schedule and methods of operation have been approved by the Engineer.
- C. The Contractor is made aware that the temporary and permanent erosion and sedimentation control measures shown on the Drawings are minimum requirements. Any additional erosion and sedimentation control measures required by the Contractor's means, methods, techniques and sequence of operation will be installed by the Contractor at no additional cost to the Owner.
- D. Perform all work under this Section in accordance with all pertinent rules and regulations including, but not necessarily limited to, those stated in these Specifications, Where provisions of pertinent rules and regulations conflict with these Specifications, the more stringent provisions shall govern.
- E. Provide all materials and promptly take all actions necessary to achieve effective erosion and sedimentation control in accordance with the South Carolina Erosion and Sedimentation Control Act of 1975, as amended (OCGA 12-7-1, et.seq.) Local ordinances, other permits, local enforcing agency guidelines and these Specifications.
- F. The Contractor shall be required to provide the RCE a submittal for each and every type of manufactured material and product to be used for the work of this section of the specification. The submittals shall establish quality assurance for the material or products to demonstrate conformance with the standards for quality assurance and quality control for the material or products as set forth in section 815 of the SCDOT Standard Specifications, latest edition.
- G. Basic Principles:
 - 1. Coordinate the land disturbance activities to fit the topography, soil types and conditions.
 - 2. Minimize the disturbed area and the duration of exposure to erosive elements.
 - 3. Provide temporary or permanent stabilization to disturbed areas immediately after rough grading is complete.
 - 4. Safely convey run-off from the site to a stable outlet to prevent flooding and damage to downstream facilities resulting from increased runoff from the site.
- H. Retain sediment on-site that was generated on-site.
- I. Minimize encroachment upon watercourses.

1.4 QUALITY ASSURANCE

- A. Temporary and permanent erosion and sedimentation controls include grassing and mulching of disturbed areas and structural barriers and all other Best Management Practices

(BMPs) required by this Contact shall be installed per all issued permits governing land disturbance(s) generated by work of this Contract;

- B. The in-place Comprehensive and On-site Stormwater Pollution Prevention Plan (C-SWPPP/OS-SWPPP) as in effect or as amended by on-going site requirements and inspections or as;
- C. As well as directed by the RCE.
- D. The commencement of Land Disturbance Activities of this Contract cannot commence until the OS-SWPPP has been fully implemented, including the issuance of the certificates of attendance to all contractors and sub-contractors.
- E. The Contractor is made aware that the temporary and permanent erosion and sedimentation control measures shown on the Drawings are minimum requirements. Any additional erosion and sedimentation control measures required by the Contractor's means, methods, techniques and sequence of operation will be installed by the Contractor at no additional cost to the Owner.
- F. The Contractor shall perform all work under this Section in accordance with all pertinent rules and regulations including, but not necessarily limited to, those stated in these Specifications, Where provisions of pertinent rules and regulations conflict with these Specifications, the more stringent provisions shall govern.
- G. The Contractor shall provide all materials and promptly take all actions necessary to achieve effective erosion and sedimentation control in accordance with the South Carolina Erosion and Sedimentation Control Act of 1975, as amended (OCGA 12-7-1, et.seq.) Local ordinances, other permits, local enforcing agency guidelines and these Specifications.
- H. Basic Principles:
 - 1. Coordinate the land disturbance activities to fit the topography, soil types and conditions.
 - 2. Minimize the disturbed area and the duration of exposure to erosive elements.
 - 3. Provide temporary or permanent stabilization to disturbed areas immediately after rough grading is complete.
 - 4. Safely convey run-off from the site to a stable outlet to prevent flooding and damage to downstream facilities resulting from increased runoff from the site.
 - 5. Retain sediment on-site that was generated on-site.
 - 6. Minimize encroachment upon watercourses.
- I. All manufactured materials and products used for the work of this section of the specifications shall conform to the requirements for quality assurance and quality control as set forth in section 815 of the SCDOT Standard Specifications, latest edition.

PART 2 – MATERIALS OR PRODUCTS

2.1 SEDIMENT BARRIER

- A. Silt Fence:

1. Type A silt fence shall meet the requirements of Section 815 of the South Carolina Department of Transportation Standard Specifications, latest edition.
 2. Silt fence fabric shall be an approved product on the SCDOT Qualified Product List No. 36, latest edition.
- B. Rock Cheek Dams: Stone shall conform to the requirements of Section 804 of the South Carolina Department of Transportation Standard Specification, latest edition, for Stone Dumped Rip Rap except the stone shall be 8-inches or less at the greatest dimension.
- C. Sediment Tubes:
1. In conformance with SCDOT Standard Specifications, Section 815.2.3.1, sediment tubes shall be composed of compacted geotextile, curled excelsior wood fiber, natural coconut fiber, hardwood mulch, or a mixture of these materials enclosed by a flexible netting material and utilize an outer netting that consists of seamless, high-density polyethylene, photodegradable material treated with ultraviolet stabilizers or a seamless, high-density polyethylene, non-degradable material.
 2. Sediment Tubes shall meet the minimum performance requirements specified in section 815.2.3.1 of the SCDOT Standard Specifications, Quality Assurance requirements specified in section 815.2.3.2 of the SCDOT Standard Specifications and Quality Control requirements specified in section 815.2.3.3 of the SCDOT Standard Specifications, latest edition

2.2 CONSTRUCTION ENTRANCE/EXITSTONE

- A. Use sound, tough, durable stone resistant to the action of air and water. Slabby or shaley pieces will not be acceptable. Aggregate size shall be in accordance with the specifications shown on the Erosion and Sediment Control Plan-Stabilized Construction Entrance and shall conform to Section 815.1.1.4 of the South Carolina Department of Transportation Standard Specifications, 2007 edition.

2.3 CONCRETE

- A. Concrete shall conform to the requirements specified in Section 321600 of these Specifications for Class 'B' concrete.

2.4 PLASTIC FILTER FABRIC

- A. Plastic filter fabric shall conform to the South Carolina Department of Transportation Standard Specifications, Section 804.2.11 for woven fabrics.
- B. Plastic filter fabric shall be an approved product on the South Carolina Department of Transportation Qualified Product List No. 28, latest edition.

2.5 GRASSING

- A. Grassing materials shall meet the requirements of the following listed sections of the South Carolina Department of Transportation Standard Specifications, latest edition:

Material	Section
Topsoil	811.2.2
Seed and Sod	810.2.2/813.2.1
Fertilizer	810.2.5
Agricultural Lime	810.2.6
Mulch	810.2.8 - 810.2.11
Inoculants	810.2.4

- B. Seed species shall be provided as shown on the Drawings.
- C. Mulch Binder: Mulch on slopes exceeding 3 (horizontal) to 1 (vertical) shall be held in place by the use of a mulch binder, as approved by the Engineer. The mulch binder shall be non-toxic to plant and animal life and shall be approved by the Engineer.
- D. Irrigation Water: Water shall be free of excess and harmful chemicals, organisms and substances which may be harmful to plant growth or obnoxious to traffic. Salt or brackish water shall not be used. Water shall be furnished by the Contractor.

2.6 Rolled Erosion Control Products (RECP)

- A. Temporary Erosion Control Blankets (ECB)
- B. Erosion control blankets will be installed as designated on the Plans or directed by the RCE. They shall be either Type A, Type B, or Type C as designated on the Plans. If the type of ECB is not specified, then it shall be understood that a Type C ECB is required to be installed
- C. The materials used for Erosion Control Blankets and the construction of Erosion Control Blankets shall conform to section 815.2.1.1 and section 815.2.1.2 of the South Carolina Department of Transportation Standard Specifications, latest edition.

2.7 Turf Reinforcement Matting (TRM)

- A. Turf Reinforcement Matting will be installed as designated on the Plans or directed by the RCE. It shall be either: Type 1, Type 2, Type 3, or Type 4 as designated on the Plans.
 - 1. A Type 1 TRM shall be installed on slopes 2H:1V or flatter or in channels where the calculated design shear stress is 4.0 lbs/ft² or less and the design flow velocity reaches a value up to 10-ft/sec.
 - 2. A Type 2 TRM shall be installed on slopes 1.5H:1V or flatter or in channels where the calculated design shear stress is 6.0 lbs/ft² or less and a design flow velocity reaches a value up to 15-ft/sec.
 - 3. A Type 3 TRM shall be installed on slopes 1H:1V or flatter or in channels where the calculated design shear stress is 8.0 lbs/ft² or less and the design flow velocity reaches a value up to 20-ft/sec.
 - 4. A Type 4 TRM shall be installed on slopes 1H:1V or greater or in channels where the calculated design shear stress is up to 12 lbs/ft² and the design flow velocity reaches a value up to 25-ft/sec, and when field conditions exist with high loading and/or high survivability requirements.
- B. Turf Reinforcement Matting for Types 1, 2 & 3 matting shall be manufactured of materials and methods as defined in sections 815.2.1.3.1 for Type 1, 815.2.1.3.2 for Type 2 and 815.2.1.3.3 for Type 3 of the SCDOT Standard Specifications, latest edition.
- C. Turf Reinforcement Matting for Type 4 3 matting shall be manufactured of material and method as defined in sections 815.2.1.3.4 of the SCDOT Standard Specifications, latest edition.
- D. Each specified TRM shall comply with the Physical Properties specified in section 815.2.1.3.5 of the SCDOT Standard Specifications, shall meet the specifications for Quality Assurance Sampling, Testing, and Acceptance specified in section 815.2.1.4 of the SCDOT Standard Specifications and the specifications for Manufacturing Quality Control specified in section 815.2.1.5 of the SCDOT Standard Specifications.

PART 3 - EXECUTION

3.1 GENERAL

- A. Temporary and permanent erosion and sedimentation control measures shall prevent erosion and prevent sediment from exiting the site. If, in the opinion of the Engineer, the Contractor's temporary erosion and sedimentation control measures or additional devices to control erosion and sedimentation on the site at no additional cost to the Owner.
- B. All erosion and sedimentation control measures and devices shall be constructed and maintained as indicated on the Drawings or specified herein until adequate permanent disturbed area stabilization has been provided and accepted by the Engineer, all temporary erosion and sedimentation control structures and devices shall be removed.

3.2 INSTALLATION

- A. Construction Entrance/Exit:

1. Construction exit(s): Shall be placed as shown on the Drawings and as directed by the Engineer. A construction exit shall be located at any point traffic will be leaving a disturbed area to a public right-of-way, street, alley, sidewalk or parking area.
 2. Placement of Construction Exit Material: The ground surface upon which the construction exit material is to be placed shall be prepared to a smooth condition free from obstructions, depressions or debris. The plastic filter fabric shall be placed to provide a minimum number of overlaps and a minimum width of one foot of overlap at each joint. The stone shall be placed with its top elevation conforming to the surrounding roadway elevations. The stone shall be dropped no more than three feet during construction.
 3. Construction Exit Maintenance: The Contractor shall regularly maintain the exit with the top dressing of stone to prevent tracking or flow of soil onto public rights-of-way and paved surfaces as directed by the Engineer.
 4. Construction Exit Removal: Construction exit(S) shall be removed and properly disposed of when the disturbed area has been properly stabilized, the tracking flow or soil onto public rights-of-way or paved surfaces has cease and as directed by the Engineer.
- B. Sediment Barriers:
1. Sediment barriers shall include, but are not necessarily limited to, silt fences, rock check dams, inlet sediment traps, sediment tubes and any device which prevents sediment from exiting the disturbed area.
 2. Silt fences, hay bales and rock check dams shall not be used in any flowing stream, creek or river.
 3. Sediment barriers shall be installed as shown on the Drawings and as directed by the Engineer.
 4. Sediment barriers shall be maintained to ensure the depth of impounded sediment is no more than one-half of the original height of the barrier or as directed by the Engineer. Torn, damaged, destroyed or washed-out shall be repaired, reinforced or replaced with new material and installed as shown on the Drawings and as directed by the Engineer.
 5. Sediment Barrier Removal:
 - a. Sediment barrier shall be removed once the disturbed area has been stabilized with a permanent vegetative cover and the sediment barrier is no longer required as directed by the Engineer.
 - b. Accumulated sediment shall be removed from the barrier and removed from the site.
 - c. All non-biodegradable parts of the barrier shall be disposed of properly.
 - d. The disturbed area created by barrier removal shall be permanently stabilized.

C. Stone Rip Rap:

1. Rip rap shall be placed as shown on the Drawings and as directed by the Engineer. Rip rap shall be placed at all points where natural vegetation is disturbed on the banks of streams or drainage ditches. Compact backfill and place rip rap to prevent subsequent settlement and erosion. This requirement applies equally to construction along side a stream or drainage ditch as well as crossing a stream or drainage ditch.
2. When trenching across a stream or drainage ditch rip rap that is to be placed shall be brought to the correct lines and grades before placement is commenced. Where filling of depressions is required, the new material shall be compacted with hand or mechanical tampers. Unless at creek banks or otherwise shown or specified, rip rap shall begin in a toe ditch constructed in original ground, and the side next to the fill or cut shall have that same slope. After the rip rap is placed, the toe ditch shall be backfilled and the excess dirt hauled off of the site and disposed of properly.
3. Placement of Plastic Filter Fabric:
 - a. Plastic filter fabric shall be placed under all rip rap unless shown or specified otherwise.
 - b. Filter fabric shall not be placed under rip rap on stream or drainage ditch crossings.
 - c. The surface to receive filter fabric shall be prepared to a smooth condition free from obstructions, depressions and debris. The filter fabric shall be installed with the long dimension running up the slope and shall be placed to provide a minimum number of overlaps. The fabric shall be placed to provide a minimum width of one foot of overlap at each joint. The fabric shall be anchored in place with securing pins of the type recommended by the fabric manufacturer. Pins shall be placed on or within 3-inches of the centerline of the overlap. The fabric shall be placed loosely to avoid stretching and tearing during the placement of the stone. The fabric shall be protected at all times during construction from clogging due to clay, silts, chemicals or other contaminants. Contaminated fabric or fabric damaged during installation or during placement or rip rap shall be removed and replaced with uncontaminated and undamaged fabric at no additional cost to the Owner.
 - d. Placement of Rip Rap: Rip rap shall be placed on a 6-inch layer of soil, crushed stone or sand overlaying the filter fabric. Rip rap shall be placed with its top elevation conforming with the finished grade or the natural existing slope of the stream bank and stream bottom. The stone shall be dropped no more than three feet during construction.
 - A) Stone Rip Rap: Stone rip rap shall be placed to provide a uniform surface to the thickness specified on the Drawings, or a minimum of 18-inches thick if unspecified. The thickness tolerance for the course shall be -3-inches and +6-inches.
 - B) Sand-Cement Bag Rip Rap: The bags shall be uniformly filled to the maximum capacity which will permit satisfactory closure. The bagged rip rap shall be placed by hand with the tied ends facing the same direction, with close, broken joints. When directed by the Engineer or required by the Drawings, header courses shall be placed. After placing, the bags shall be rammed or packed against

one another to produce the required thickness and form a consolidated mass. The top of each bag shall not vary more than 3-inches above or below the required plane.

D. Gabions:

1. Where, in the opinion of the Engineer, the slope of the banks of the stream are too steep to support rip rap, gabions shall be provided, in lieu of rip rap.
2. Gabions shall be assembled to the manufacturer's recommendations. Laterally adjoining gabions shall be wired together along the front and back edges. Rip rap size for the gabion construction shall be large enough not to fall out of gabions, but small enough to form three layers. Gabions shall be placed over a 6-inch layer of soil, crushed stone or sand overlaying a filter fabric.

E. Grassing:

1. Grassing shall meet the requirements of Section 810/813 of the South Carolina Department of Transportation Standard Specifications, 2007 edition, unless specified otherwise.
2. Seed rate, fertilization and other requirements shall be provided as shown on the Drawings or may be as specified elsewhere within the Contact Specifications for Seeding or in the Special Provisions.
3. Temporary stabilization: Temporary stabilization shall be provided as shown on the Drawings and conforming to these Specifications to control erosion on the site. Temporary stabilization shall be provided to any area which will not receive permanent stabilization within the next 14 calendar days. Partial payment requests may be withheld for those portions of the Project not complying with this requirement.
4. Permanent Stabilization:
 - a. Permanent stabilization shall be provided as shown on the Drawings and conforming to these Specifications to control erosion on the site. Permanent stabilization shall be provided to all areas of land disturbance within seven calendar days of the completion of land disturbance for any area greater than 0.25 acre. Partial payment requests may be withheld for those portions of the Project not complying with requirement.
 - b. Where permanent stabilization cannot be immediately established because of an inappropriate season, the Contractor shall provide temporary stabilization. The Contractor shall return to the site at the appropriate season to provide permanent stabilization in areas that received only temporary stabilization.

F. Temporary Erosion Control Blankets (ECB)

1. Erosion Control Blankets shall be placed as shown on the Plans, in accordance with issued permits, and as directed by the RCE.
2. Erosion Control Blankets shall be placed in areas where problem conditions exist where normal grassed stabilization cannot reasonable be achieved or where potential problems are anticipated in certain areas in order to minimize soil erosion and siltation and, or where natural vegetation is disturbed on the banks of streams or drainage ditches.

3. ECBs shall be installed in compliance with the means and methods specified in the SCDOT Standard Specifications, latest edition and South Carolina DHEC Storm Water Management BMP Handbook, latest edition for Best Management Practices (BMPs).
- G. Turf Reinforcement Matting
1. Turf Reinforcement Matting shall be placed as shown on the Plans, in accordance with issued permits, and as directed by the RCE.
 2. Turf Reinforcement Matting shall be placed in areas where problem conditions exist where normal grassed stabilization cannot reasonable be achieved or where potential problems are anticipated in certain areas in order to minimize soil erosion and siltation and, or where natural vegetation is disturbed on the banks of streams or drainage ditches.
 3. TRMs shall be installed in compliance with the means and methods specified in the SCDOT Standard Specifications, latest edition and South Carolina DHEC Storm Water Management BMP Handbook, latest edition for Best Management Practices (BMPs).

3.3 FIELD QUALITY CONTROL

- A. All erosion and sedimentation control devices and structures shall be inspected by the Contractor at least once a week and immediately prior to each rainfall occurrence. Any device or structure found to be damaged will be repaired or replaced by the end of the day. Sediment ponds shall be cleaned out prior to the silt reaching the height or elevation shown on the Drawings.

3.4 CLEAN-UP

- A. Dispose of all excess erosion and sedimentation control materials in a manner satisfactory to the RCE.
- B. Final clean-up shall be performed in accordance with the requirements of these Specifications.

PART 4 - MEASUREMENT

4.1 GENERAL

- A. The quantity for the specified pay items in this section-Erosion and Sediment Control is to be determined as specified by section 815.5 of the SCDOT Standard Specifications-edition 2007.
- B. If the pay item for Sediment and Erosion Control is not included in the Contract, that pay item shall not be measured for payment directly and is considered included in contract unit bid price of the various other items of work.

PART 5 - PAYMENT

5.1 GENERAL

- A. Payment for the accepted quantity of pay items for Erosion and Sediment Control, measured in accordance with subsection 815.5 or 813.5 of the SCDOT Standard Specifications-2007 edition, is determined using the contract unit bid price for the pay item, or as;
- B. Specified elsewhere in the contract documents.
- C. Payment is full compensation for pay items for Erosion and Sediment Control as specified or directed and includes all materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to complete the Work in accordance with the Plans, the Specifications, and other terms of the Contract.

END OF SECTION 31 25 00

SECTION 32 12 16 ASPHALT PAVING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This work shall cover the composition, mixing, construction upon the prepared subgrade, and the protection of hot asphalt concrete pavement. The hot asphalt concrete pavement shall consist of an aggregate or asphalt base course and asphalt surface course constructed in conformity with the lines, grades, thickness, and cross sections as shown. Each course shall be constructed to the depth, section, or elevation required by the drawings and shall be rolled, finished, and approved before the placement of the next course.
- B. The extent and location of asphalt paving is shown on the drawings.

1.2 RELATED WORK

- A. Pavement Markings: Section 32 17 23 .17, PAVEMENT MARKINGS.

1.3 ALIGNMENT AND GRADE CONTROL

- A. The Contractor's Registered Professional Land Surveyor shall establish and control the pavement (aggregate or asphalt base course and asphalt surface course) alignments, grades and elevations as shown on the Drawings.

1.5 SUBMITTALS

- A. In accordance with Section 01 33 00, SUBMITTAL PROCEDURES.
- B. Data and Test Reports:
 - 1. Aggregate Base Course: Sources, gradation, liquid limit, plasticity index, percentage of wear, and other tests required by State Highway Department.
 - 2. Asphalt Base/Surface Course: Aggregate source, gradation, soundness loss, percentage of wear, and other tests required by State Highway Department.
 - 3. Job-mix formula.
- C. Certifications:
 - 1. Asphalt prime and tack coat material certificate of conformance to State Highway Department requirements.
 - 2. Asphalt cement certificate of conformance to State Highway Department requirements.
 - 3. Job-mix certification - Submit plant mix certification that mix equals or exceeds the State Highway Specification.
- D. One copy of State Highway Department Specifications.
- E. Provide MSDS (Material Safety Data Sheets) for all chemicals used on ground.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Aggregate base and asphalt concrete materials shall conform to the requirements of the following and other appropriate sections of the latest version of the State Highway Material Specifications.

2.2 AGGREGATES

- A. Provide aggregates consisting of crushed stone, gravel, sand, or other sound, durable mineral materials processed and blended, and naturally combined.
- B. Subbase aggregate (where required) maximum size: 1-1/2".
- C. Base aggregate maximum size:
 - 1. Base course over 6" thick: 1-1/2".
 - 2. Other base courses: 3/4".
- D. Asphaltic base course:
 - 1. Maximum particle size not to exceed 1".
 - 2. Where conflicts arise between this specification and the requirements in the latest version of the State Highway Specifications, the State Specifications shall control.
- E. Aggregates for asphaltic concrete paving: Provide a mixture of sand, mineral aggregate, and liquid asphalt mixed in such proportions that the percentage by weight will be within:

<u>Sieve Sizes</u>	<u>Percentage Passing</u>
19mm(3/4")	100
9.5mm(3/8")	67 to 85
6.4mm(1/4")	50 to 65
2.4mm(No. 8 mesh)	37 to 50
600µm(No. 30 mesh)	15 to 25
75µm(No. 200 mesh)	3 to 8

plus 50/60 penetration liquid asphalt at 5 percent to 6-1/2 percent of the combined dry aggregates.

2.3 ASPHALTS

- A. Comply with provisions of Asphalt Institute Specification SS2:
 - 1. Asphalt cement: Penetration grade 50/60.
 - 2. Prime coat: Cut-back type, grade MC-250.
 - 3. Tack coat: Uniformly emulsified, grade SS-1H.

2.4 SEALER

- A. Provide a sealer consisting of suitable fibrated chemical type asphalt base binders and fillers having a container consistency suitable for troweling after thorough stirring, and containing no clay or other deleterious substance.
- B. Where conflicts arise between this specification and the requirements in the latest version of the State Highway Specifications, the State Specifications shall control.

PART 3 - EXECUTION

3.1 GENERAL

- A. The Asphalt Concrete Paving equipment, weather limitations, job-mix formula, mixing, construction methods, compaction, finishing, tolerance, and protection shall conform to the requirements of the appropriate sections of the State Highway Specifications for the type of material specified.

3.2 MIXING ASPHALTIC CONCRETE MATERIALS

- A. Provide hot plant-mixed asphaltic concrete paving materials.
 - 1. Temperature leaving the plant: 290 degrees F minimum, 320 degrees F maximum.
 - 2. Temperature at time of placing: 280 degrees F minimum.

3.3 SUBGRADE

- A. Shape to line and grade and compact with self-propelled rollers.
- B. All depressions that develop under rolling shall be filled with acceptable material and the area re-rolled.
- C. Soft areas shall be removed and filled with acceptable materials and the area re-rolled.
- D. Should the subgrade become rutted or displaced prior to the placing of the subbase, it shall be reworked to bring to line and grade.
- E. Proof-roll the subgrade with maximum 50 ton gross weight dump truck as directed by Architect. If pumping, pushing, or other movement is observed, rework the area to provide a stable and compacted subgrade.

3.4 BASE COURSES

- A. Subbase (when required)
 - 1. Spread and compact to the thickness shown on the drawings.
 - 2. Rolling shall begin at the sides and continue toward the center and shall continue until there is no movement ahead of the roller.
 - 3. After completion of the subbase rolling there shall be no hauling over the subbase other than the delivery of material for the top course.
- B. Base
 - 1. Spread and compact to the thickness shown on the drawings.
 - 2. Rolling shall begin at the sides and continue toward the center and shall continue until there is no movement ahead of the roller.
 - 3. After completion of the base rolling there shall be no hauling over the base other than the delivery of material for the top course.
- C. Thickness tolerance: Provide the compacted thicknesses shown on the Drawings within a tolerance of minus 0.0" to plus 0.5".
- D. Smoothness tolerance: Provide the lines and grades shown on the Drawings within a tolerance of 3/16 inch in ten feet.
- E. Moisture content: Use only the amount of moisture needed to achieve the specified compaction.

3.5 PLACEMENT OF ASPHALTIC CONCRETE PAVING

- A. Remove all loose materials from the compacted base.
- B. Apply the specified prime coat, and tack coat where required, and allow to dry in accordance with the manufacturer's recommendations as approved by the Architect.

C. Receipt of asphaltic concrete materials:

1. Do not accept material unless it is covered with a tarpaulin until unloaded, and unless the material has a temperature of not less than 280 degrees F.
2. Do not commence placement of asphaltic concrete materials when the atmospheric temperature is below 50 degrees F, not during fog, rain, or other unsuitable conditions.

D. Spreading:

1. Spread material in a manner that requires the least handling.
2. Where thickness of finished paving will be 3" or less, spread in one layer.

E. Rolling:

1. After the material has been spread to the proper depth, roll until the surface is hard, smooth, unyielding, and true to the thickness and elevations shown on the drawings.
2. Roll in at least two directions until no roller marks are visible.
3. Finished paving smoothness tolerance:
 - a. No depressions which will retain standing water.
 - b. No deviation greater than 1/8" in six feet.

3.6 APPLICATION OF SEAL COAT

- A. Prepare the surfaces, mix the seal coat material, and apply in accordance with the manufacturer's recommendations as approved by the Architect.
- B. Achieve a finished surface seal which, when dry and thoroughly set, is smooth, tough, resilient, of uniform black color, and free from coarse textured areas, lap marks, ridges, and other surface irregularities.
- C. When sealing new asphalt paving wait an entire year to allow for the expansion and contraction of a year's cycle of both warm and cool temperatures. This allows for the asphalt's oils to properly cure and begin oxidation before applying a seal coat.
- D. When seal coating in less than a year apply two coats, spray applied. This application method is preferred for less than a year application when there is still plenty of asphalt cement present for the seal coat to bond to.

3.7 PROTECTION

Protect the asphaltic concrete paved areas from traffic until the sealer is set and cured and does not pick up under foot or wheeled traffic.

3.8 FINAL CLEAN-UP

Remove all debris, rubbish, and excess material from the work area.

END OF SECTION 32 12 16

SECTION 32 16 00 CONCRETE SIDEWALK, CURBING AND DRIVEWAY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Special Provisions and Division 31 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Concrete sidewalk and curbing, including header curbs, shall be constructed of Portland cement concrete, at the locations and to the dimensions, lines, grades and cross section indicated on the Drawings or as directed by the Engineer and in conformity with the provisions and requirements set out in these Specifications.
- B. Concrete driveways shall be constructed of Portland Cement concrete, at the locations and to the dimensions, lines, grades and cross section indicated on the Drawings or as directed by the Engineer, and in conformity with the provisions and requirements set out in these Specifications.
- C. Concrete sidewalk, curbing and driveway shall include all the necessary excavation, unless otherwise indicated, subgrade and subbase preparation, backfilling, final clearing up and completing all incidentals thereto, as indicated on the Drawings or as directed by the RCE.
- D. Related Sections
 - 1. Section 321723.13 - Permanent Pavement Markings-Paint
 - 2. Section 329219 - Seeding

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. The Contractor shall provide the RCE with an approved mix design that conforms to the intent of the work of the project. An approved mix design shall be provided for each type of concrete mix to be manufactured and used to perform the work of this Section.

1.4 INFORMATIONAL SUBMITTALS

- A. The Contractor shall provide the RCE with shop drawings and product submittals related to or for work of this Section, including cement product, aggregate, fillers, admixtures etc.

- B. The Contractor shall provide the RCE with documentation in writing in accordance with section 1.5F.
- C. The Contractor shall provide the RCE with documentation in writing in accordance with section 1.5G identifying the required credentials and names of the certified installers who shall be participating directly in the slip form placement of the concrete walkway and any associated work of this section.

1.5 QUALITY ASSURANCE

- A. **Benchmarks:** The Contractor shall establish and maintain two corresponding permanent bench marks on the site for reference. All vertical dimensions shall be checked from these bench-marks.
- B. **Finish Grades:** Finished grades, as used herein, mean the final grade elevations indicated on the drawings. Should finished grades shown on spot elevations conflict with those shown by the contours, the spot elevations shall govern.
- C. **Preliminary Grading:** Contractor shall remove soft organic type material from all areas within the construction areas. The work area shall be graded to lines and elevations of the Contract drawings and compacted to accept the product.
- D. All concrete products to be used for the work of this Section shall be provided by a vendor/supplier who is on the SCDOT list of approved vendors or suppliers. Each specific concrete mix shall be approved for use by the RCE to complete work of this Section through the submittal of a Job Design Mix.
- E. The concrete to be used for the work of this Section shall be generated by a plant that is on the SCDOT list of approved plants.
- F. Prior to award the contractor shall submit evidence of two successful slip form concrete pavement projects of similar size and design, including but not limited to the following:
 - G. Project name and address/location, owner name and contact information
 - H. Test results including type and unit weight of concrete placed, width and length of mat placed and mat thickness.
- I. The Contractor shall provide a minimum of three (3) ACI Certified Concrete Flatwork Finishers or NRMCA certified installers and/or craftsmen to perform the work of this section of the Contract.
- J. Prior to the commencement of placement of the concrete walkway or other associate concrete placement, the Contractor shall identify the means of his/her choice for addressing compliance of the concrete truck backwashing process to the issued permit requirements/approved plans and identify the location(s) of proposed backwash collection areas on a plan provided to the RCE.

PART 2 – MATERIALS OR PRODUCTS

2.1 PRODUCTS

- A. Materials used in the construction of sidewalks, curbing and driveways, in addition to the general requirements of these Specifications, shall conform, unless otherwise stipulated, to the following:
- B. Concrete shall be manufactured of the materials meeting the requirements of Section 701 of the SCDOT Standard Specifications, 2007 edition for Class 2500 Portland cement concrete at a minimum, or as specified on the Plans.
- C. Crushed stone for base, if required or specified on the drawings, shall meet the gradation requirements for Size 7 or 8 as specified in ASTM D 448 or AASHTO M43.EXECUTION

2.2 FORM MATERIAL

- A. Fixed Form
 - 1. Forms may be constructed of wood or metal.
 - 2. The lumber to be used in the construction of wood forms shall be free of bulge or warp, of uniform width, not less than 2-inches (commercial) in thickness, except that 1-inch thickness, may be used on curves and shall be sound and free from loose knots. The lumber shall be of a depth equal to the thickness of the concrete course to be placed. Stakes shall be not less than 2 x 4-inch lumber of sufficient length that, when driven they will hold the forms rigidly in place. Plywood used to shape radii shall be free of bulge or warp, of uniform width, not less than ¼ inches (commercial) in thickness, be of a depth equal to the thickness of the concrete course to be placed and shall be sound and free from loose knots or deformities.
 - 3. Metal forms shall be approved sections and shall have a flat surface on top and be of a depth equal to the thickness of the concrete course to be placed. They shall present a smooth surface of the desired contour, sufficiently thick and braced to withstand the weight of the concrete without bulging or becoming displaced.
- B. Slip Forming
 - 1. The Contractor shall use a slip form paver designed and manufactured for the placement of concrete pavement. The paving equipment shall be in good working condition and well maintained and capable of performing the work of this Section.
 - 2. The Contractor shall provide sufficient equipment of the type and size necessary to enable safe and expeditious prosecution of the work of the Section in accordance with the project schedule and completion of the work in the specified time.
 - 3. All placement of concrete pavement/sidewalk/walkway shall be done in accordance with SCDOT Standard Specifications, latest edition.
 - 4. The Contractor shall provide experienced, trained and qualified personnel to operate the slip form paver to perform the work of this Section and other work associated with this section.

PART 3 - EXECUTION

3.1 LABOR

- A. For finishing; competent and skilled finishers shall be provided.

3.2 EQUIPMENT

- A. All equipment necessary and required for the construction of concrete sidewalks, curbing and driveways, must be on the Project, proven to be in first class working condition and approved by the RCE, before construction will be permitted to begin.
- B. A one bag mixer will be permitted when the total output of concrete, per 10 hour day does not exceed 25 cubic yards.
- C. Satisfactory floats, edgers, spades and tamps shall be furnished. Tamps of not over 8-inch diameter and weighing not less than 25 pounds shall be provided for tamping subgrade. A

10 foot longitudinal float of the inverted T-type with plough handles attached for manipulation, and a rigid float not less than 18-inches longer than the width of the walk being constructed, shall be provided.

3.3 CLEARING AND GRUBBING

- A. Clearing and grubbing shall be performed in accordance with the requirements of Section 310201 of these Specifications.

3.4 REMOVAL OF STRUCTURES AND OBSTRUCTIONS

- A. Unless otherwise indicated or stipulated, the removal of structures, obstructions, etc., will be performed in accordance with the requirements of Section 310202 of these specifications and in accordance with Section 202 of the SCDOT Standard Specifications, 2007 edition.

3.5 ROAD AND DRAINAGE EXCAVATION

- A. Road and drainage excavation, as indicated on the Drawings or as directed by Engineer, shall be performed in accordance with the requirements of Section 203 of the SCDOT Standard Specifications, 2007 edition and per Section 310203 of these specifications.

3.6 SUBGRADE PREPARATION

- A. The subgrade for sidewalks, curbing and driveways shall be formed by excavation to a depth equal to the thickness of the concrete +/- 1/2-inches.
- B. All subgrade shall be of such width and dimension as to permit the proper installation and bracing of the forms or provide safe and adequate access for the slip form paver.
- C. Yielding, or unsuitable material encountered in the subgrade shall be removed and backfilled with satisfactory material. 6-inches of graded aggregate base shall be

placed under commercial/industrial driveways, compacted thoroughly and finished to a smooth, unyielding surface and proper line, grade and cross section of the proposed construction.

- D. All work related to Subgrade preparation shall be done in accordance with Section 310208- Subgrade of these specifications.

3.7 FORMS

A. FIXED

1. All forms shall be set upon the prepared subgrade, true to lines and grade, and held rigidly in place so as to not be disturbed or displaced during the placing of the concrete. The top of the form shall be set to exact grade and the height shall be equal to not less than the thickness of the proposed concrete.
2. All forms shall be so constructed as to form the cross section, contour, etc., of the proposed construction.
3. Immediately before placing the concrete, the forms shall be given a coat of light oil and where being removed and used again, the forms shall be thoroughly cleaned and oiled each time.
4. Forms shall be removed within 24 hours after placing concrete and no pressure shall be exerted upon the concrete in removing forms.
5. When the sidewalk is to be joined to an existing sidewalk, the existing sidewalk, if not in proper condition for the junction, shall be cut to a neat line perpendicular to both the centerline and the surface, or as indicated by the Engineer.

B. SLIP FORMING

1. The Contractor shall provide equipment in good working condition that is capable of performing the slip forming of the concrete slab to the means and extents of this specification.
2. Prior to the commencement of the slip forming operations, the RCE shall be allowed to inspect the equipment in order to determine its condition and suitability to perform the work of the Contract.
3. The Contractor shall provide well trained and qualified operators and labors familiar each piece of equipment and with all aspects of slip forming.
4. Upon completion of the placement of the slab, it shall have its surface finished in accordance with the Plans and specifications.

C. EXPANSION JOINTS

1. Unless otherwise indicated on the Drawings or as directed by the RCE, premoulded expansion joint filler, ½ inch in thickness, shall be placed at the locations indicated on the Drawings and in line with expansion joints in the adjoining pavement, gutter, and not otherwise. A ½ inch pre-moulded expansion joint filler shall be placed at intervals of not over 50 feet apart.

All premoulded expansion joint filler must be cut to full width or length of the proposed construction and shall extend to within $\frac{1}{4}$ inch of the top or finished surface. All longitudinal expansion joints shall be placed as indicated on the Drawings or as directed by the Engineer.

2. All expansion joints shall be true, even and present a satisfactory appearance.
3. All expansion joint material protruding after the concrete has been finished shall be trimmed as directed by the RCE.

D. MANUFACTURING AND PLACING CONCRETE

1. Immediately before placing concrete, the depth of the proposed concrete shall be checked by means of a template cut true to the cross section of the proposed construction and any irregularities shall be corrected.
2. Immediately before placing concrete, all subgrade shall be thoroughly sprinkled or wetted.
3. Concrete shall not be placed upon a frozen subgrade or subbase.
4. Construction joints will be permitted only at grooves or at expansion joints, unless otherwise approved by the Engineer.
5. The concrete shall be manufactured of the materials meeting the requirements of Section 701 of the SCDOT Standard Specifications, 2007 edition for Class 2500 Portland cement concrete at a minimum or as per the Plans.
6. The concrete shall be placed immediately after mixing, the edges, sides, etc., shall be thoroughly spaded and the surfaces tamped sufficiently to thoroughly compact the concrete and bring the mortar to the surface. The concrete shall be deposited and compacted in a single layer.

E. FINISHING

1. The concrete for sidewalks and driveways shall be stuck-off with a transverse template resting upon the side forms and then shall be floated with a 10 foot longitudinal float working the float transversely across the concrete with a sawing motion, always maintaining it parallel to the edges of the sidewalk, or driveway, where practicable, and in such a manner that all surplus water, laitance and inert material shall be removed from the surface. This operation shall be continued until the surface of the concrete shows no variation from 10 foot straightedge. If necessary, additional concrete shall be added to fill depressions, and the longitudinal float used again. The longitudinal float shall not be moved ahead more than one-half its length at any time.
2. When the surface of the concrete is free from water and just before the concrete obtains its initial set, it shall be gone over and finished with a wooden float so as to produce a sandy texture. The longitudinal surface variations shall be not more than $\frac{1}{4}$ -inch under a 12 foot straightedge, nor more than $\frac{1}{8}$ -inch on a five foot transverse section. The surface of the concrete must be finished so as to drain completely at all times.

3. The edges of the sidewalks, curbing or driveways shall be carefully finished and rounded with an edging tool having a radius of ½ inch.
4. The surface of sidewalks shall be divided into blocks by use of a grooving tool. Grooves shall be placed so as to cause contraction joints to be placed at a groove line, where practical. The grooves shall be spaced approximately five feet apart and the blocks shall be rectangular unless otherwise ordered by the Engineer. The grooves shall be cut to a depth of not less than 1-inch. The edges of the grooves shall be edged with an edging tool having a radius of 1/4-inch, and any marks caused by edging or otherwise shall be removed with a wetted brush or wooden float so as to give the surface a uniform texture and finish.
5. The edges of the concrete at contraction joints shall be rounded with an edging tool having a radius of 1/4-inch. The top and ends, where practicable, of expansion joint material shall be cleaned of all concrete and the expansion joint material shall be trimmed so as to be slightly below the surface of the concrete. All marks caused by edging shall be removed with a wetted brush or wooden float.

F. PROTECTION AND CURING

1. Immediately after finishing the concrete, it shall be covered and cured in accordance with the accepted standards and practices of the SCDOT Standard Specifications, 2007 edition. If the temperature falls to below freezing, satisfactory heating devices shall be placed under suitable covers to keep the temperature around the concrete at above 45 degrees F.
2. Pedestrians will not be allowed upon concrete sidewalks or driveways until 12 hours after finishing concrete, and no vehicles or loads shall be permitted upon any sidewalk or driveway until the concrete has attained sufficient strength for such traffic.
3. The Contractor shall construct such barricades and protection devices as are necessary to keep pedestrians and traffic off the sidewalks or driveways.
4. If any sidewalk or driveway or curbing is damaged at any time previous to final acceptance of the project, it shall be repaired by removing all concrete within the limits of the grooves, and be replaced, at the Contractor's expense, with concrete of the type, the kind and finish in the original construction.

G. BACKFILLING

1. Immediately after the concrete has set sufficiently, the spaces along the sides or edges of the sidewalk or driveway or curbing shall be refilled with suitable material, this material shall be in compacted layer of not over 4-inches each, until firm and solid.

H. CLEANING

1. All excess or unsuitable material shall be removed and disposed of in accordance with requirements of SCDOT Standard Specifications, 2007 edition.
2. Final clean-up and restoration shall be performed in accordance with the

requirements of SCDOT Standard Specifications, 2007 edition.

3. All suitable material becoming the property of the Owner shall be stored in a manner and at locations near or on the Project as directed by the RCE. All unsuitable material shall become the property of the Contractor for safe and regulated disposal off site at an approved, permitted site.

PART 4 - MEASUREMENT

4.1 GENERAL

- A. The quantity for the pay items Concrete Curb, Concrete Gutter, or Concrete Curb and Gutter (of type and size specified) is the length of the cast-in-place curb and/or gutter and is measured by the linear foot (LF), complete, and accepted. Measurement shall be per Subsection 720.5 of the SCDOT Standard Specifications, 2007 edition.
- B. The quantity for the pay items Concrete Sidewalk, Concrete Driveways and Concrete Median is the finished surface area of the top of the cast-in-place sidewalk, driveway or median and is measured by the square yard (SY), complete, and accepted. Measurement shall be per Subsection 720.5 of the SCDOT Standard Specifications, 2007 edition.
- C. If the pay items, for items of work of this Section of the Specifications, are not included in the Contract, then the items of work of this Section of the Specifications are not measured for payment directly and are considered included in contract unit bid price of the various other items of work of the Contract.

PART 5 - PAYMENT

5.1 GENERAL

- A. Payment for the accepted quantity for Concrete Curb, Concrete Gutter, or Concrete Curb and Gutter, Concrete Sidewalk, Concrete Driveways, Concrete Median, measured in accordance with subsection 720.5 of the SCDOT Standard Specifications-2007 edition, is determined using the contract unit bid price for the pay item, or as;
- B. Specified elsewhere in the contract documents.
- C. Payment is full compensation for Concrete Curb, Concrete Gutter, or Concrete Curb and Gutter, Concrete Sidewalk, Concrete Driveways, Concrete Median as specified or directed and includes all materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to complete the Work in accordance with the Plans, the Specifications, and other terms of the Contract.

END OF SECTION 32 16 00

SECTION 32 17 23.13 PERMANENT PAVEMENT MARKINGS – FAST DRY WATERBORN PAINT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Special Provisions and Division 31 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes:
 - 1. Specifications for the materials, equipment, construction, measurement, and payment for furnishing and applying reflectorized, heavy metals free, fast drying, waterborn paint for pavement markings within the limits of the project to delineate the travel lanes and channelize traffic.
- B. The Contractor is advised to use markings that are the color (white or yellow) and pattern indicated in the approved Pavement Marking Plans, the SCDOT Pavement Marking Typical or the MUTCD, as applicable. This work includes supplying all necessary equipment and materials for the correct application of the marking material to the pavement surface, protecting pavement markings during installation, determining no passing zones for two-lane facilities in accordance with the MUTCD.
- C. The work of this section shall include protection of pavement markings during installation and paving operations, installing and maintaining pavement markings in areas to be finished with Thermoplastic Pavement Markings, determination of no passing zones for two-lane facilities in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) and providing the RCE/Owner the data used in establishing no passing zones on two-lane facilities.
- D. Related Sections:
 - 1. Section 321600- Concrete Sidewalk, Curbing & Driveways
 - 2. Section 329219- Seeding
 - 3. Section 312500 – Erosion and Sediment Control

1.3 ACTION SUBMITTALS

- A. Product Data: Submit product data in accordance with the requirements of these Specifications.
- B. The Contractor shall also provide the RCE a final certification that the materials furnished for water-born fast dry marking paint meet the requirements set forth in section 625 of the SCDOT Standard Specifications, latest edition, for Permanent

Pavement Markings.

- C. The Contactor shall also provide the RCE a certification obtained from the manufacture of the drop-on glass beads that states the material furnished meets the requirements of the Contract specifications.
- D. The Contractor shall submit a Permanent Pavement Marking plan to the RCE. That plan shall include the layout, alignment, color and location of all materials and products that shall be used to complete the work of this Section, including but not limited to the removal of existing pavement markings that could conflict with the intent of the approved plan. The work or details of the Permanent Pavement Marking plan shall only be implemented and installed after it is reviewed and approved by the RCE in writing and or supplemented by direction given by the RCE.
- E. In addition to initial acceptance of submittals, the water-born fast dry marking paint may be required to be sampled, tested, and approved by the SCDOT OMR or their designated representative before shipment. At the discretion of the RCE, additional sampling and testing at the project/job site may be performed.
- F. Minimum Manufacturer's Certification labeling shall be as follows:
 - 1. State Specification Number
 - 2. Manufacturer's Product Number
 - 3. Color (White or Lead-Free Yellow)
 - 4. Weight of Sample
 - 5. Identification numbers of batched comprising the lot & lot number
 - 6. Date of manufacture
 - 7. Form (block or granular)
 - 8. Binder Type- Alkyd
 - 9. Sampling Methods (splitting, thieving, quartering, random bag, etc.)
 - 10. South Carolina File Number or Contract Number
- G. For all other inspection and sampling requirements for permanent pavement marking materials refer to Subsection 625 of the SCDOT Standard Specifications, latest edition.

1.4 INFORMATIONAL SUBMITTALS

1.5 QUALITY ASSURANCE

- A. The Contractor shall have the horizontal layout of the work of this section performed by experienced and trained personnel with the work of this Section being done in conformance with the standards set forth in the Manual on Uniform Traffic Control Devices (MUTCD), current edition.
- B. The Contractor shall only use product that is supplied by a supplier or vendor who is

on the SCDOT List of Qualified Suppliers/Vendors.

- C. Upon request, the Contractor shall provide the RCE with documentation, shipping invoices, bills of lading that substantiate that the product or materials on the work of this section comply with the approved submittals.
- D. The Contractor shall provide the RCE with documentation that the paint to be used meets the specifications of section 625.2.2 through section 625.2.3 of the SCDOT Standard Specifications. The Contractor shall provide skilled, trained, experienced personnel and suitable equipment in good working condition to perform the work of this Section.
- E. The Contractor shall provide all necessary traffic control devices and flagmen necessary to safely perform the work of this Section.

PART 2 – PRODUCTS

2.1 PRODUCTS

- A. The Contractor shall provide and use pavement marking that consists of traffic paint, meeting the requirements given herein, upon which spherical glass beads are applied by dropping immediately following paint application. If required, clean the pavement surface in an appropriate manner as described herein immediately prior to application.
- B. The Contractor shall provide and install white and/or yellow paint that meets the following general requirements:
 - 1. The paint shall be formulated and manufactured from top grade materials and free from defects and imperfections that might adversely affect the serviceability of the finished product.
 - 2. The paint shall be formulated and processed specifically for service as a suitable binder for glass beads for use on traffic-carrying pavements, including Portland cement concrete, asphalt pavement, and brick.
 - 3. The paint shall dry to an elastic adherent finish that does not darken after exposure to sunlight, does not show appreciable discoloration with age, or darken under service such that the color or visibility to the reflectorized marking is impaired. Ease and uniformity of application and covering properties.
 - 4. The paint shall be free of heavy metals as defined in Subsection 625.2.2.4.11.
 - 5. The paint shall provide the proper anchorage and refraction for glass beads when both binder and spheres are applied in the stipulated quantities with specialized equipment using pressurized bead guns.
 - 6. The paint shall be manufactured and sealed in containers in such manner that during normal shelf life does not show evidence of settling or livering that causes the paint to be unusable or is detrimental to the specialized equipment used in application.
 - 7. The paint shall not show evidence of skinning when received in sealed

containers

8. EXECUTION

2.2 GENERAL

- A. The Contractor shall be responsible for the installation or implementation of the work of this Section in accordance with Subsection 609.4.1.1.2 and/or section 625.4 through section 625.4.3.9 of the SCDOT Standard Specifications, 2007 edition.
- B. The Contractor shall be responsible for the proper and adequate cleaning and preparation of the surface or surfaces that have been constructed to receive the work of this Section.
- C. The Contractor shall be responsible for ensuring that the equipment necessary for the proper construction of the work is on site, in acceptable working condition, and approved by the RCE as to both type and condition before the start of work under this section. Provide sufficient equipment to enable prosecution of the work in accordance with the project schedule and completion of the work in the specified time.
- D. The Contractor shall be responsible for use and coordination of the proper traffic control indicated in the Contract, the SCDOT Standard Drawings, the MUTCD, or as directed by the RCE to allow for the safe removal of existing pavement markings, surface preparation, and/or the installation of new pavement markings.
- E. The Contractor shall ensure that the pavement is dry and free of glaze, oil, dirt, grease, or other foreign contaminants before proceeding with the placement of any pavement markings. Where directed by the RCE, the Contractor shall remove any existing markings that conflict with the Pavement Marking Plans by an approved method before the application of painted pavement marking. Use approved removal methods, which are shot blast, sand blast, or grinding.
- F. The Contractor shall be responsible for implementation/placement of the approved permanent pavement markings as indicated on the approved Pavement Marking Plan to the satisfaction of the RCE and in accordance with accepted industry standards.

PART 3 - EXECUTION

3.1 GENERAL

- A. The quantities for fast dry painted pavement marking for lines are measured by the linear foot (LF) along the center of the pavement marking lines for each width and color of pavement marking line in-place, complete and accepted. The measurement includes the length of the painted marking only and excludes spaces between broken lines.
- B. The quantities for fast dry painted pavement marking symbols (arrow, word, railroad crossing, handicap, and biking symbol, etc.) are measured by each (EA) symbol in-place, complete and accepted. A railroad crossing symbol consists of "X RR".
- C. Traffic control utilized during the performance of painted pavement marking work is not measured under items covered by this section, but may be as included in the item Traffic Control in accordance with Subsections 107.12 and 601.5 of the SCDOT Standard Specifications.

- D. Unless included in other pay items in the Contract, the work required to remove existing or temporary pavement markings is considered incidental to the work under this section and is not measured separately.
- E. Unless included in other pay items in the Contract, determination of the no passing zones for two-lane facilities and providing the RCE or Owner with the data used in establishing the zones is considered incidental work for the painted pavement marking items and is not measured for payment.

PART 4 - PAYMENT

4.1 GENERAL

- A. Payment for the accepted quantity for each type of permanent or temporary pavement marking measured in accordance with Subsection 625.5 of the SCDOT Standard Specifications, latest edition and per Part 4 of this Section of the specifications is determined with the contract unit price bid for the applicable item, or as;
- B. Specified elsewhere in the contract documents.
- C. Payment is full compensation for applying permanent or temporary pavement markings as specified or directed and includes preparing the pavement surface; removing unacceptable pavement markings; and all materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to fulfill the requirements of the pay item in accordance with the Plans, the Specifications, and other terms of the Contract.
- D. No payment shall be made for removal of existing pavement markings related to the placement of permanent pavement markings or putting the approved permanent pavement marking plan in place.
- E. Unless otherwise included in the Contract, the traffic control for application and/or removal of pavement markings will be included in the pay item Traffic Control in accordance with Subsections 107.12 and 601.6 of the SCDOT Standard Specifications, latest edition.
- F. No separate payment shall be made for determination of no passing zones for two-lane facilities and for providing the RCE with the data used in establishing the zones. This item shall be considered incidental to other various items of work.
- G. Payment for each item in this Section includes all direct and indirect costs and expenses required to complete the Work and gain acceptance.

END OF SECTION 32 17 23.13

SECTION 32 92 19 SEEDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Special Provisions and Division 31 Specification Sections, apply to this Section.
- B. The Comprehensive Storm Water Pollution and Prevention Plan (C-SWPPP) and the On-Site Storm Water Pollution and Prevention Plan (OS-SWPPP) in effect for this project. The Contractor and each sub-contractor is required to attend a mandatory preconstruction conference at which time they will be documented as having been present for the conference and thereby certified as having attended the conference in conformance with the OS- SWPPP requirements.

1.2 SUMMARY

- A. Section includes:
 - 1. The work covered by this Section consists of furnishing all labor, equipment and material required to place topsoil, seed, commercial fertilizer, agricultural limestone and mulch material, including seedbed preparation, harrowing, compacting and other placement operations on graded earthen areas as described herein and/or shown on the Drawings. In general, seeding operations shall be conducted on all newly graded earthen area not covered by structures, pavement or sidewalks; all cleared or grubbed areas which are to remain as finish grade surfaces; and on all existing turf areas which are disturbed by construction operations and which are to remain as finish grade surfaces. Areas disturbed by borrow activities shall also be seeded according to these Specifications.
- B. The work shall include temporary seeding operations to stabilize earthen surfaces during construction or inclement weather and to minimize stream siltation and erosion. Temporary seeding shall be performed at the times and locations as directed by the BMPs.
- C. Related Sections:
 - 1. Section 321723.13- - Permanent Pavement Markings-Paint
 - 2. Section 321600- Concrete Sidewalk, Curbing & Driveways
 - 3. Section 312500- Erosion and Sediment Control

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. See Section 810.21 of the SCDOT Standard Specifications, latest edition.

1.4 QUALITY ASSURANCE

- A. Prior to seeding operations, the Contractor shall furnish to the Engineer labels or certified laboratory reports from an accredited commercial seed laboratory or a state seed laboratory showing the analysis and germination of the seed to be furnished. Acceptance of the seed reports shall not relieve the Contractor of any responsibility or liability for furnishing seed meeting the requirements of this Section.
- B. Prior to topsoil operations, the Contractor shall obtain representative samples and furnish soil test certificates including textural, pH, and organic analysis from the State University Agricultural Extension Services or other certified testing laboratory.
- C. All seeding, whether temporary or permanent, shall be done in accordance with SCDOT Standard Specifications, latest edition, Section 810

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. All materials shall conform to the requirements and standards of this Section.
- B. Wood-cellulose fiber mulch shall be manufactured by Weyerhaeuser Company or Conway Corporation or approved equal.
- C. All seed to be used to complete the work of this Section shall conform to the state laws and requirements and regulations of the South Carolina Department of Agriculture (SCDA).

2.2 TOPSOIL

- A. Utilizing designated stockpiles or borrow areas on site, the contractor shall place a minimum of 4-inches of topsoil over all graded earthen areas and over any other areas to be seeded. Sources of topsoil shall be approved by the Engineer prior to disturbance. Importing topsoil from offsite sources shall be at the discretion of the Engineer and shall be justification for additional compensation to the Contractor. A change order properly authorized by the Owner shall be agreed upon prior to importing offsite topsoil. No additional compensation will be allowed for spreading of topsoil.
- B. Topsoil shall be friable containing a large amount of humus and shall be original surface soil of good, rich, uniform quality, free from any material such as hard clods, stiff clay, hardpan, partially disintegrated stone, pebbles larger than 1/2-inch diameter, lime cement, bricks, ashes, cinders, slag, concrete, bitumen or its residue, boards, sticks, chips or other undesirable material harmful or unnecessary to plant growth. Topsoil shall be reasonably free from perennial weeds and shall not contain objectionable plant material, toxic amounts of either acid or alkaline elements or vegetable debris undesirable or harmful to plant life.
- C. Topsoil shall be natural topsoil and shall be classifiable as loam, silt loam, clay loam, sandy loam, or a combination thereof. The pH range shall be from 5.5 to 7.0. Topsoil shall contain not less than five percent not more than 20 percent, by weight, of organic matter as determined by loss on ignition of over-dried samples to 65 degrees C.

2.3 SEED

- A. Seed shall be delivered in new bags that are sound and labeled in accordance with the U.S. Department of Agriculture Federal Seed Act.

- B. All seed shall be from the last crop available at time of purchase and shall not be moldy, wet or otherwise damaged in transit or storage.
- C. Seed shall bear the growers analysis testing to 98 percent for purity and 90 percent for germination. At the discretion of Engineer, samples of seed may be taken for verification against the grower's analysis.
- D. Species, rate of seeding, fertilization and other requirements are shown in Table 1 of this Section.

2.4 FERTILIZER AND LIMING MATERIALS

- A. Fertilizer and liming materials shall comply with applicable state, local and federal laws concerned with their production and use.
- B. Commercial fertilizer shall be a ready mixed material equivalent to the grade or grades specified in subsection 810.2.5 of the SCDOT Standard Specifications, 2007 edition. Container bags shall have the name and address of the manufacturer, the brand name, net weight and chemical composition.
- C. Agricultural limestone shall be a pulverized dolomitic limestone having a calcium carbonate content of not less than 85 percent by weight and shall conform to subsection 810.2.6 of the SCDOT Standard Specifications, 2007 edition. Agricultural limestone shall be crushed so that a least 85 percent of the material will pass a No.10 mesh screen and 50 percent will pass a No.40 mesh screen.

2.5 MULCH MATERIAL

- A. All mulch materials shall be air dried and reasonably free of noxious weeds and weed seeds or other materials detrimental to plant growth.
- B. Mulch shall be composed of wood cellulose fiber, straw or stalks, as specified herein. Mulch shall be suitable for spreading with standard mulch blowing equipment.
- C. Straw mulch shall be partially decomposed stalks of wheat, rye, oats or other approved grain crops.
- D. Stalks shall be the partially decomposed, shredded residue of corn, cane, sorghum or other approved standing field crops.

2.6 MULCH BINDER

- A. Mulch on slopes exceeding 3 to 1 ratio shall be held in place by the use of an approved mulch binder. The mulch binder shall be non-toxic to plant life and shall be acceptable to the Engineer.
- B. Emulsified asphalt tackifier shall meet the requirements of Subsection 407.2.4 of the SCDOT Standard Specifications, edition 2007 and shall be Grade SS-1, ASTM D 977. Cutback asphalt binder shall be Grade RC 70 or RC 250.

2.7 INNOCULANTS FOR LEGUMES

- A. All leguminous seed shall be inoculated prior to seeding with a standard culture of nitrogen-fixing bacteria that is adapted to the particular seed involved.

2.8 IRRIGATION WATER

- A. Water shall be clean, clear water free from any objectionable or harmful chemical qualities or organisms and shall be furnished by the Contractor.

PART 3 – EXECUTION

3.1 SECURING AND PLACING TOPSOIL

- A. Topsoil, where specified on the Drawings, shall be secured from areas from which topsoil has not been previously removed, either by erosion or mechanical methods. Topsoil shall not be removed to a depth in excess of the depth approved by the RCE.
- B. Unless otherwise directed by the RCE, all topsoil stripped under other Sections of the work of this contract shall be stockpiled and secured in accordance with all permits or regulations.
- C. At the end of the Contract, if the stockpiled material is not scheduled or needed for use to complete work of this or other Sections of the Contract and upon receipt of a written directive from the RCE, it shall become the property of the Contractor for removal and disposal at an offsite location. Disposal of stockpiled topsoil shall be done in accordance and compliance with all applicable local, State and Federal Laws.
- D. The area or areas from which topsoil is secured shall possess such uniformity of soil depth, color, texture, drainage and other characteristics as to offer assurance that, when removed the product will be homogeneous in nature and will conform to the requirements of these Specifications.
- E. All areas from which topsoil is to be secured, shall be cleaned of all sticks, boards, stones, cement, ashes, cinders, slag, concrete, bitumen or its residue and any other refuse which will hinder or prevent growth.
- F. In securing topsoil from a designated pit, or elsewhere, should strata or seams of material occur which do not come under the requirements for topsoil, such material shall be removed from the topsoil or if required by the Engineer, the pit shall be abandoned.
- G. Before placing or depositing topsoil upon any areas, all improvement within the area shall be completed, unless otherwise approved by the Engineer.
- H. The areas in which topsoil is to be placed or incorporated shall be prepared before securing topsoil for use.

3.2 SEEDBED PREPARATION

- A. Before fertilizing and seeding, the topsoil surfaces shall be trimmed and worked to true line from unsightly variation, bumps, ridges and depressions and all detrimental material, roots and stones larger than 3-inches in any diameter shall be removed from the soil.
- B. Not earlier than 24 hours before seed is to be sown, the soil surface to be seeded shall be thoroughly cultivated to a depth of not less than 4-inches with a weighted disc, tiller, pulvimixer

or other equipment, until the surface is smooth and in a condition acceptable to the Engineer.

- C. If the prepared surface becomes eroded as a result of rain or for any other reason, or becomes crusted before the seed is sown, the surface shall again be placed in a condition suitable for seeding.
- D. Ground preparation operations shall be performed only when the ground is in a tillable and workable condition, as determined by the Engineer.

3.3 FERTILIZATION AND LIMING

- A. Following seedbed preparation, fertilizer shall be applied to all areas to be seeded so as to achieve the application rates shown in Table 'A'. (Below)
- B. Fertilizer shall be spread evenly over the seedbed and shall be lightly harrowed, raked, or otherwise incorporated into the soil for a depth of 1-inch.
- C. Fertilizer need not be incorporated in the soil as specified above when mixed with seed in water and applied with power sprayer equipment. The seed shall not remain in water containing fertilizer for more than 30 minutes when a hydraulic seeder is used.
- D. Agricultural limestone shall be thoroughly mixed into the soil according to the rates shown in Table A. The specified rate of application of limestone may be reduced by the Engineer if pH tests indicate this to be desirable. It is the responsibility of the Contractor to obtain such tests and submit the results to the Engineer for adjustment in rates.
- E. It is the responsibility of the Contractor to make one application of a maintenance fertilizer according to the recommendations listed in Table 'A' (Below).

3.4 SEEDING

- A. Seed of the specified group shall be sown as soon as preparation of the seedbed has been completed. No seed shall be sown during high winds, nor until the surface is suitable for working and is in a proper condition. Seeding shall be performed during the dates shown in Table A unless otherwise approved by the Engineer. Seed mixtures may be sown together provided they are kept in a thoroughly mixed condition during the seeding operation.
- B. Seed shall be uniformly sown by any approved mechanical method suitable for the slope and size of the areas to be seeded, preferably with a broadcast type seeder, windmill hand seeder or approved mechanical power drawn seed drills. Hydro-seeding and hydro-mulching may be used on steep embankments, provided full coverage is obtained. Care shall be taken to adjust the seeder for seeding at the proper rate before seeding operations are started and to maintain their adjustment during seeding. Seed in hoppers shall be agitated to prevent segregation of the various seeds in a seeding mixture.
- C. Immediately after sowing, the seeds shall be covered and compacted to a depth of 1/8 to 3/8-inch by a cultipacker or suitable roller.
- D. Leguminous seeds shall be inoculated prior to seeding with an approved and compatible nitrogen-fixing inoculant in accordance with the manufacturer's mixing instructions.

3.5 MULCHING

- A. All seeded areas shall be uniformly mulched in a continuous blanket immediately after

seeding. The mulch shall be applied evenly so as to permit sunlight to penetrate and the air to circulate and at the same time shade the ground, reduce erosion and conserve soil moisture. Approximately 45 percent of the ground shall be visible through the mulch blanket.

- B. One of the following mulches shall be spread evenly over the seeded areas at the following application rates:
 - 1. Wood Cellulose Fiber: 1,400 pounds/acre.
 - 2. Straw: 4,000 pounds/acre.
 - 3. Stalks: 4,000 pounds/acre.
 - 4. These rates may be adjusted at the discretion of the Engineer at no additional cost to the Owner, depending on the texture and condition of the mulch material and the characteristics of the seeded area.
- C. Mulch on slopes greater than 3 to 1 ratio shall be held in place by the use of an approved mulch binder. Binder shall be thoroughly mixed and applied with the mulch. Emulsified asphalt or cutback asphalt shall be applied at the approximate rate of five gallons per 1,000 square feet as required to hold the mulch in place.
- D. The Contractor shall cover structures, poles, fences and appurtenances if the mulch binder is applied in such a way that it would come in contact with or discolor the structures.
- E. Mulch and binder shall be applied by suitable blowing equipment at closely controlled application rates in a manner acceptable to the Engineer.

3.6 IRRIGATION WATERING

- A. The Contractor shall be responsible for maintaining the proper moisture content of the soil to insure adequate plant growth until a satisfactory stand is obtained. If necessary, watering shall be performed to maintain an adequate water content in the soil.
- B. Watering shall be accomplished by hoses, tank truck or sprinklers in such a way to prevent erosion, excessive runoff and over-watered spots.

3.7 MAINTENANCE

- A. Upon completion of seeding operations, the Contractor shall clear the area of all equipment, debris and excess material and the premises shall be left in a neat and orderly condition.
- B. The Contractor shall maintain all seeded areas without additional payment until final acceptance of the work by the Owner, and any regrading, refertilizing, reliming, reseeding or remulching shall be done at Contractor's own expense. Seeding work shall be repeated on defective areas until a satisfactory uniform stand is accomplished. Damage resulting from erosion, gully's, washouts or other causes shall be repaired by filling with topsoil, compacting and repeating the seeding work at Contractor's expense.

TABLE A SEEDING REQUIREMENTS

			Rates per acre
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Area	Sowing Season	Species	Seed	Fertilizer	Limestone	Maintenance
Temporary Flat to Rolling Terrain with Slopes Less than 3:1	8/1 - 4/1	Ryegrass	40 lbs.	500 lbs.(10-10-10)	2000 lbs.	400 lbs. (10-10-10)
	4/1 - 8/1	Sudangrass	60 lbs.	500 lbs. (10-10-10)	2000 lbs.	400 lbs. (10-10-10)
Temporary Embankments with Slopes Greater than 3:1	3/1 - 6/1	Weeping Lovegrass	4 lb.	500 lbs. (10-10-10)	2000 lbs.	400 lbs. (10-10-10)
Permanent Flat to Rolling Terrain with Slopes Less than 3:1	3/1 - 6/15	Wilmington Bahia &	30 lbs.	1500 lbs. (6-12-12)	2000 lbs.	400 lbs (10-10-10)
	8/15 - 10/30	Bermuda, Common (hulled) Fescue, Tall	6 lbs. 50 lbs.	1500 lbs. (6-12-12)	2000 lbs.	400 lbs. (10-10-10)

Permanent Embankments with Slopes Greater than 3:1	3/1 - 6/30	Common Bermuda (Hulled Seed)& Weeping Lovegrass	6 lb. 2 lb.	1500 lbs. (6-12-12)	2000 lbs.	400 lbs. (10-10-10)
	9/1 - 3/30	*Lespedeza Sericea & Tall Fescue	60 lbs. 30 lbs.	1500 lbs. (6-12-12)	2000 lbs.	400 lbs. (10-10-10)

Note: Omit lime application in permanent grass establishment if it follows temporary grass established in the same area.

*Inoculate seed with EL inoculate.

PART 4 - MEASUREMENT

4.1 GENERAL

- A. The quantity for the pay item Permanent Vegetation, Temporary Vegetation, Temporary Seeding, Seeding (Unmulched) or Seeding (Mulched) is the ground surface area with acceptable vegetation or stand of grass and is measured by the one-thousand square yard (MSY) unit, complete, and accepted.
- B. If the pay item Permanent Vegetation, Temporary Vegetation, Temporary Seeding, Seeding (Unmulched) or Seeding (Mulched) is not included in the Contract, the Permanent Vegetation, Temporary Vegetation, Temporary Seeding, Seeding (Unmulched) or Seeding (Mulched) is not measured for payment directly and is considered included in contract unit bid price of the various other items of work.

PART 5 - PAYMENT

5.1 GENERAL

- A. Payment for the accepted quantity for Permanent Vegetation, Temporary Vegetation, Temporary Seeding, Seeding (Unmulched) or Seeding (Mulched), shall be measured in accordance with subsection 810.5 of the SCDOT Standard Specifications-2007 edition, and is determined using the contract unit bid price for the pay item, or as;
- B. Specified elsewhere in the contract documents.
- C. Payment is full compensation for Permanent Vegetation, Temporary Vegetation, Temporary Seeding, Seeding (Unmulched) or Seeding (Mulched) as specified or directed and includes all materials, labor, equipment, tools, supplies, transportation, and incidentals necessary to complete the Work in accordance with the Plans, the Specifications, and other terms of the Contract.

END OF SECTION 32 92 19

END OF PROJECT MANUAL