Project Manual

EXCERPT INCL DIVISION 01 GENERAL REQUIREMENTS

BID NUMBER – BID-SJR-06-2018

Renovation with Addition To Building V, St. Augustine Campus

2990 College Drive
St. Augustine, Florida 32084

TO BE CONSTRUCTED FOR:

ST. JOHNS RIVER STATE COLLEGE

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1.01 INVITATION TO BID

St. Johns River State College (SJR State) invites pre-qualified general contractors for calendar year 2019 in Category 2 and above to bid as the primary bidder on the following named project:

BID No.: **BID NUMBER: BID-SJR-06-2018**

TITLE: RENOVATIONS WITH ADDITION TO BUILDING V-
ST. AUGUSTINE CAMPUS
For
ST. JOHNS RIVER STATE COLLEGE
2990 COLLEGE DRIVE
ST. AUGUSTINE, FLORIDA 32084

1.02 MANDATORY PRE-BID MEETING

A mandatory pre-bid meeting will be held at 2:00 p.m. DST on Tuesday, March 26, 2019, in Room L-112 on the SJR State St. Augustine Campus, 2990 College Drive, St. Augustine, FL 32084 for the purpose of familiarizing the bidders with the conditions of the project. Attendance at the pre-bid meeting by invited pre-qualified contractors, or their designated representative, is required in order to be eligible to bid. Attendance will be taken. The meeting is open to the public, and attendance by potential sub-contractors is always welcomed but not mandatory. A tour of Building V and the worksite will follow immediately after the meeting.

1.03 PRE-QUALIFIED BIDDERS

This project is limited to invited Pre-Qualified General Contractors in Category 2 and greater for Calendar Year 2019, and only those bids submitted by the aforementioned Pre-Qualified General Contractors attending the mandatory pre-bid meeting will be considered.

1.04 BIDS

Sealed bids marked on the outside with the contractor's name and **BID-SJR-06-2018** will be received at the Office of the Director of Capital Contract Management, St. Johns River State College, Business Office, 5001 St. Johns Avenue, Palatka, Florida 32177 until:

LOCAL TIME: **2:00 P.M. DST**
DAY OF WEEK: **Tuesday**
DATE: **April 30, 2019**

Bids received by the deadline for submission will be opened at a public meeting on April 30, 2019, at **2:30** p.m., read aloud, and recorded, in Room A-154 at the Palatka Campus of St. Johns River State College, 5001 St. Johns Avenue, Palatka, FL, 32177.

1.05 CONTRACT DOCUMENTS FOR BIDDING

A. The Contract Documents for bidding may be examined and obtained at the office of the Architect by purchase or issued electronically by email:

Akel, Logan and Shafer, PA.
704 Rosselle Street
Jacksonville, Florida 32204
(904) 356-2654
E-mail: mbishop@alsarchitect.com

B. General: Contract Documents, consisting of the Project Manual and Drawings, in whole, are available at the Design Professional's office.
1. Documents will be issued electronically by email in PDF form.
2. Hard copies of these documents can be obtained by receipt of a check or money order made payable to Akel, Logan and Shafer, PA. for the total required amount and presented to the architect. Payments for each Contract Document Set shall be separate from shipping charges. **Do not combine payments.** Note:
   a. Requests for billing will **not** be honored.
   b. Cash or checks will be accepted.
   c. Contract Document Cost: Shipping charges are in addition to below stated amounts.

ITEM	NON-REFUNDABLE /EACH SET
Complete Set Contract Documents	$150.00

C. Ownership of Contract Documents: Documents, regardless of method of procurement, remain the property of the Owner and shall be issued for no purpose other than bidding on or constructing this project.

1.06 BONDS

A. The successful contractor is required to furnish Performance and Payment Bonds described in the Contract Documents.

B. Bid guarantee in the form of a Bid Bond executed by the bidder and a qualified surety or a certified or cashier's check on any national or state bank in the amount of five percent (5%) of the base bid and any alternates proposal made payable to St. Johns River State College must accompany competition, and after opening bids, in the event the contract is awarded to the bidder, the bidder will within ten (10) days after receiving same, execute contract and furnish the required bonds, failing which the security shall become the property of the College as liquidated damages.

1.07 PREPARATION AND SUBMISSION OF PROPOSAL

A. All bids shall be made on Bid Checklist/Response Proposal Form included herein, properly executed, sealed and placed in an envelope and marked on the outside with the name of the firm and **BID-SJR-06-2018.**

B. In addition to the Bid Checklist/Response Proposal Form, bidders are required to provide each document listed on the Bid Checklist/Response Form.

C. Deliver or mail Bids to Beverly Barker, Director of Capital Contract Management, St. Johns River State College, Business Office, 5001 St. Johns Avenue, Palatka, Florida 32177 as indicated previously under 1.04.

D. Changes in the bid amount appearing on the outside of the bid envelope will **not** be considered. Only the bid amount shown inside the envelope will be considered. All changes, corrections and erasures on the inside of the bid envelope **must be initialed** by the person signing the Bid.

E. Faxed, e-mailed, conditional, and bids received after the deadline for submission will not be considered. It is the responsibility of the bidder to ensure delivery to the correct location. Failure of a delivery service or US mail to deliver bid responses by the due date and time shall not constitute an extension to the deadline. The College is not responsible for any expense incurred by the bidder in responding to this bid.

F. St. Johns River State College reserves the right to reject any or all bids, waive any informalities in regards thereto, to make the award in whole or in part, to rebid or not, and to make the award which is in the best interest of the College. It is the intention of the College to award a contract to a single qualified bidder submitting the lowest base bid and for any alternate proposals contingent upon availability of funding.

End of Section

SECTION 00 21 13 INSTRUCTIONS TO BIDDERS

1.01 INTENT OF OWNER

The bid award shall be made to the lowest and best proposal, Base and Alternates within budget, which meets or exceeds the conditions of the bid specifications and the College reserves the right to award by individual item, groups of items, "All or None" or a combination thereof contingent upon budget availability. The College is not necessarily bound to accept the lowest bid if that bid is contrary to the best interests of the College. St. Johns River State College reserves the right to waive any minor deviations in otherwise valid bid proposal, to waive any informalities, to reject any or all bid proposals, and to accept the bid which will be in the best interest of SJR State. In addition, the College shall have the right to reject any bid not accompanied by data required by the bid specifications, or a proposal in any way incomplete or irregular. Conditional bids will not be accepted. Should the lowest Bidder exceed the proposal budget of the Owner, the Owner may negotiate with the Bidder in order to obtain a bid within budget, including but not limited to College direct purchase of materials.

1.02 BID

A. Sealed bids will be received by the date, time and location so stated in SECTION 00 11 16 INVITATION TO BID. Attendance by the invited bidder or his authorized representative at the mandatory pre-bid meeting is a requirement in order to be able to bid on this project. The bidder or his authorized representative is invited to be present at the bid opening and bid award meeting but attendance is not required at either.

1.03 PROPOSALS

A. All work on the project shall be included in the bid for the general contract. Bids for this project shall be submitted *in duplicate* on the bid forms enclosed in this Project Manual. The bid shall be sealed in an envelope and marked to indicate the contractor's name and Bid Number BID-SJR-06-2018. The envelope shall then be forwarded or delivered to the Owner at the address listed in SECTION 00 11 16 INVITATION TO BID.

1. The Bidder shall fill in his bid completely, providing price quotations for Base Bid and all Alternates and correctly sign his bid. Bids that show any omissions, alterations, additions not authorized by the Owner, conditional bids or irregularities of any kind, may be rejected.

2. Bids shall be submitted in sufficient time for receipt by the Owner by or before the scheduled bid deadline. Bids received after the scheduled bid date and time will not be considered. No changes will be permitted after bids have been submitted.

3. Bids may <u>not</u> be withdrawn for a period of sixty (60) days after the scheduled closing time for bids.

4. Bid results and notice of intent concerning award of the bid will be posted on the College's web page dedicated to this bid at http://www.sjrstate.edu/062018. All bidders must consult this page for information and notices as the bid process progresses. Bidders are considered to be notified as to bid results and notices when posted by the college on the web page dedicated to this bid.

B. Bidders shall submit the following documents with their Bid, in quantities as indicated on the Bid Form:

Bid Checklist/Response Proposal Form
Sub-Contractor Listing
Drug-Free Workplace Form
Trench Safety Certification
Bid Form Attachment
Bid Bond Form

1.04 CONTRACTOR AND SUBCONTRACTOR QUALIFICATIONS

A. All Bidders shall be licensed General Contractors and licensed corporations and all subcontractors shall be licensed for their respective disciplines, if applicable, as required by the laws of the State of Florida.

1.05 SITE LOCATION AND INVESTIGATION

A. Each bidder, before submitting his bid, shall examine the site and all pertinent conditions to determine the conditions under which he must perform the Work.

B. Site Location:

ST. JOHNS RIVER STATE COLLEGE
ST. AUGUSTINE CAMPUS
STUDENT SERVICES – BUILDING V
2990 COLLEGE DRIVE
ST. AUGUSTINE, FLORIDA 32084

C. The submittal of a bid shall be construed as evidence that appropriate examination has been made. No subsequent allowance will be made in this connection. Access to the site will be made on the day of the Mandatory Pre-Bid Meeting; afterwards, to gain access, the Bidder shall contact:

Mr. Mike Canaday
St. Johns River State College
5001 St. Johns Avenue
Palatka, Florida 32177
Telephone: 386/312-4091

D. Mandatory Pre-Bid Meeting: Held in Room L-112, St Johns River State College, 2990 College Drive, St. Augustine, FL <u>at 2:00 PM DST</u> on Tuesday, <u>March 26, 2019</u> for purposes of familiarizing the bidders with the conditions of the project. Attendance at the pre-bid meeting by invited Bidders, or their designated representative, is required in order to be eligible to bid and attendance will be taken. Tentative Agenda is as follows:

1. Attendance roster to be signed by all attendees.
2. Introduction of Owner Architect/Engineer Project Team.
3. Project Summary and Scope of Work
4. Availability of Documents
   a. Plan Rooms
   b. General Contractors
   c. Set Purchases (full), see Invitation to Bid
5. Instructions to Bidders and Review of Bid Process
6. Contractual Agreement

7. Bid Proposal Form with Proposal Submission Requirements & List (s) of Subcontractors
8. Submittals, Products, and Substitutions
9. Addenda Schedule
10. Contractor Question Period (answers will be included in Addendum One)
11. Closing Statements & Work Site Visit

1.06 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

A. Should a Bidder find discrepancies, ambiguities or conflicts in, or omissions from the Drawings and Specifications, or should Bidder be in doubt as to its meaning, the Bidder shall at once notify the Design Professional for an interpretation which will be conveyed in the form of an addendum. Interpretive addenda will be forwarded to all Bidders, and each Bidder shall acknowledge receipt of each Addendum on his bid in the spaces provided.

1. Bidders shall address all inquiries for this project to:
   Akel, Logan and Shafer, PA
   704 Rosselle Street
   Jacksonville, Florida 32204
   Contact: Project Manager, Melody Bishop
   Telephone: (904) 356-2654
   Facsimile: (904) 356-4010
   Email: mbishop@alsarchitects.com

2. Questions concerning the bidding process and bid specifications, other than the technical specifications, may be directed to (and copied to Melody Bishop, Project Manager identified above):
   Beverly J. Barker
   Director of Capital Contract Management
   Email: BeverlyBarker@sjrstate.edu
   Telephone: (386) 312-4110.

B. Standard Basis for Bidding:
1. Equality: Where materials, etc., are referred to in the specifications as "equivalent to" or words of similar import, the Design Professional shall decide as to equality. In addition to data required under paragraph "Shop Drawings" and "Manufacturer's Description data", the contractor shall furnish other detailed data as required by the Design Professional for comparison if the product is mentioned by name. All data shall be submitted at least seven (7) days prior to the scheduled bid opening date. No extra will be allowed because of such substitution, if permitted, either for the article substituted or for revisions in other work affected by the substitution.
2. Equivalents: In these specifications where one certain kind, type or brand of material manufacturer is named, it shall be regarded as the required minimum standard of quality. Substitutions lowering the performance, quality, method of assembly of installation, or in general, not in keeping with the details and specifications will not be permitted. It is understood that when a bid is submitted, the bidder is aware of the requirements, and that the materials within his bid are equal to or better on such items and that prior approval of substitutions has been obtained.

3. No time extensions will be permitted, to revise or redesign a product found not to comply, and that evidence of noncompliance shall automatically classify the bid as having been informal and rejected.

4. Since time is of the essence, the College cannot be expected to delay the award of bid, and their decisions shall be in strict accordance to the details and specifications, these items should be brought to the attention of the Design Professional of the project and of the College prior to submitting a bid proposal

C. Subcontractors

1. The successful bidder shall employ the subcontractors listed in the bidder's proposal along with the class of work to be performed by each. This list shall not be modified in any way whatsoever without the written consent of the College to ensure those subcontractors shall be utilized for the specified class of work.
2. Modifications to the listed subcontractors may be granted by the College only in those instances where the bidder presents written evidence that use of the listed subcontractor would not be in the best interest of the College.

1.07 CONTRACT TIME

A. Time for completion (Contract Time) for this project is a condition of the Contract and time is of the essence. The time for completion is indicated in Section 00700, Supplementary Conditions and an extension of time is not anticipated. If the bidder cannot meet the construction schedule, they should not submit a bid.

1.08 TEMPORARY AGREEMENTS AND COSTS

A. The Bidder shall be responsible for all temporary excavations, scaffolding, guardrails, vehicle and pedestrian passageways and other temporary work, which will extend beyond the boundaries of the property. Costs of such arrangements, agreements and work shall be borne by the Bidder and shall be included in his bid price.

1.09 PERMITS, FEES, AND TAXES

A. Building permits are required for work on the College site but the cost of which should not be submitted with the bid proposal.

B. The College does not pay federal, excise, or state sales taxes.

C. Cost of electrical, water and gas permits and tap fees, fees for inspections as required by county and/or state authorities, social security and other applicable state and federal government taxes, and costs of all other permits, inspections, licenses and taxes for which the Bidder is liable shall be included in his bid for the work.

D. Cost of social security and other applicable state and federal government taxes and any sales taxes for which the bidder is liable shall be included in the proposal for the work.

1.10 BID SECURITY, BID BOND

A. Bid guarantee (security) in the form of a Bid Bond executed by the bidder and a qualified surety or a certified or cashier's check on any national or state bank shall be required in the amount of five percent (5%) of the base bid proposal and all alternates, made payable to St. Johns River State College and shall be submitted with the bid proposal. In the event contract is awarded to the bidder, bidder will within ten (10) business days after award execute contract and furnish the required payment and performance bonds, failing which the bid security shall become the property of St. Johns River State College as liquidated damages. Section 00020, Invitation to Bid and Section 00300, Form of Proposal. A duplicate copy of the Bid Security shall be submitted along with the original.

1.11 BID RESPONSE MATERIALS

A. The materials submitted in response to this invitation to bid becomes the property of the College upon delivery to the Office of the Director of Capital Contract Management and may be appended to any formal document which would further define or expand the contractual relationship between the College and the successful bidder.

1.12 RETURN OF BID SECURITY, BID BOND

A. All Bid Securities and good faith deposits will be returned after the tabulation and analysis of the bids upon request except for the three (3) lowest bidders; these will be returned upon request within fifteen (15) days following the award of the Contract.

1.13 DISQUALIFICATION OF BIDDERS

A. Only one bid from an individual, firm, partnership or corporation under either the same or different names will be considered.

B. Should there be any reasonable grounds for the Owner to believe that a collusion or combination exists among Bidders, any or all bids may be rejected and all such Bidders or participants in such combination or collusion will <u>not</u> be considered in a future bid for the same work.

C. No bid will be considered valid unless accompanied by a Bid Security or good faith deposit in the amount and in the form specified in the Invitation to Bid.

D. Bids that are incomplete or not signed by the Bidder may be rejected.

E. Bids that are submitted without the Sub-bidders listing completed as required in this Section and indicated in Section 00300, Form of Proposal may be rejected.

F. Bids that do not include all alternates, where applicable, will be rejected.

1.14 TIED BIDS

A. The decision for the award of tied bids shall be made after careful review of the circumstances surrounding the tie. Pursuant to FS 287.087, the College will break a tie/award to a business that has implemented a drug-free workplace program; if still tied, a coin toss in the presence of the Design Professional and the Senior Vice President and General Counsel, when all other factors are equal.

1.15 NOTICES

A. Bid results and bid notices, including notice of intent to award bid and bid award or rejection will be posted on the web page dedicated to this bid at http://www.sjrstate.edu/062018 and bidders are required to monitor this web page during the entire bid process.

1.16 BID PROTESTS

A. Bid protests pursuant to Florida Statutes §120.57 shall be served on Lynn Powers, Vice President for Finance and Administration/CFO and Beverly Barker, Director of Capital Contract Management, St. Johns River State College, 5001 St. Johns Avenue, Palatka, Florida 32177 all via certified mail. Bid protests may be preliminarily filed, if followed by a certified mail original, via facsimile transmittal to Lynn Powers 386/312-4167 and Beverly Barker at 386/312-4167 Bid protests must be accompanied by a cost deposit of five thousand dollars ($5,000.00) or one percent of the total contract price, whichever is greater.

B. In the event the protesting party is not the prevailing party, as a result of final agency action taken by pursuant to §120.57, said cost deposit shall be retained by the College to defray its costs, expenses and fees, including reasonable attorney's fees with respect to their participation in the bid protest process. Furthermore, the unsuccessful protester shall be responsible to the College for all other and additional reasonable fees, expenses and costs, in the event the deposit which the College retains pursuant to this paragraph is insufficient to reimburse the College for all costs and fees incurred. Failure to file a protest within the time prescribed in section 120.57(3), Florida Statutes, or failure to post the bond or other security required by law within the time allowed for filing a bond shall constitute a waiver of proceedings under chapter 120, Florida Statutes.

1.17 PERFORMANCE AND PAYMENT BOND

A. Within ten (10) days after the Notice of Award, the successful Bidder shall furnish a satisfactory Performance and Payment Bond. The Bond shall be provided by a corporate Surety authorized to do business in the State of Florida and acceptable to the Owner. The Bond shall be conditioned well and truly to perform the Contract and pay all bills and invoices for labor done, delay damages and materials furnished in the performance of the Work including a guarantee period of (1) year or longer, if required in the individual technical sections of the Specifications, against unacceptable work.

B. All Bonds must be executed under corporate seal of the Surety and countersigned on the part of the Surety by a qualified resident agent of the company or an attorney in fact with proof of power attached.

C. In case of default on the part of the Bidder, actions for all expenses incident to ascertaining and collecting losses under the Bond including both architectural and legal services shall lie against the Bond.

D. Such Bond shall be in the penal sum of 100% of the Contract.

E. Premiums for the Performance and Payment Bond shall be included in the Bidder's bid.

F. The Bond shall be on AIA Document Form A312.

1.18 EXECUTION OF CONTRACT

A. Within ten (10) days after Notice of Award, the successful Bidder shall enter into a formal contract and furnish a satisfactory Performance and Payment Bond.

B. Failure to execute the Contract as provided in these documents within ten (10) days from the date of the Notice of Award shall be just cause and the Owner may annul and void the award and declare forfeiture of the bid guarantee or good faith deposit in liquidation of all damages sustained.

C. Award may then be made to the next lowest responsible Bidder, or the work may be re-bid at the Owner's discretion.

D. No award or costs will be binding upon the Owner until the construction Contract has been executed by the Owner.

E. The construction Contract shall be signed in triplicate by the Owner and the Bidder.

1.19 SEVERABILITY

A. If any provisions of the agreement resulting from this bid are contrary to, prohibited by, or deemed invalid by applicable laws or regulations of any jurisdiction in which it is sought to be enforced, then said provisions shall be deemed inapplicable and omitted and shall not invalidate the remaining provisions of the agreement.

In the event any provision of this agreement shall be held invalid or unenforceable by a court of competent jurisdiction, or by an administrative hearing officer in accordance with Chapter 120, Florida Statutes, such holding shall not invalidate or render unenforceable any other provision hereof.

1.20 INDEMNIFICATION

A. The firm shall indemnify and hold harmless the College, and any agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or injury to or destruction of tangible property (other than the Work itself) including loss of use resulting therefrom, but only to the extent caused in whole or in part by negligent acts or omissions of the Firm or anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense, is caused in part by a party indemnified hereunder. Such obligations shall not be considered to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist.

1.21 VENUE

A. The contract, when entered into and any disputes hereunder, shall be construed in accordance with the laws of the State of Florida and enforced in the courts of the State of Florida. College and Firm hereby agree that venue shall be in Putnam County, Florida.

End of Section

SECTION 00 22 13

SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

The following supplements modify, change, delete from or add to the Instructions to Bidders

Where any Article of the Instructions to Bidders is modified or any Paragraph, Subparagraph, or Clause thereof is modified or deleted by these Supplementary Instructions to Bidders, the unaltered provisions of that Article, Paragraph, Subparagraph or Clause shall remain in effect.

Add the following new Articles:

Article 9, Liquidated Damages

9.1 The Bidder agrees that liquidated damages in the amount of *One Thousand Dollars ($1,000.00) per calendar day* for each day the work remains incomplete, shall be assessed against the Bidder if the work is not completed within the specified time limit. It shall be understood that liquidated damages are not a penalty, but are intended to provide a means of recovery of actual damages suffered by the Owner as a result of delayed completion.

Article 10, Contract Time

10.1 Contract time to Substantial Completion is 420 Calendar Days.

The following is Supplemental Bid Information

Definitions

The College, SJR State, or St. Johns River State College, refers to the District Board of Trustees of St. Johns River State College, Palatka, Florida. The College is a political subdivision of the State of Florida.

Firm, vendor, contractor or bidder in this document refers to respondents to this invitation to bid.

Taxes

The College does not pay federal, excise, or state sales taxes. Florida Sales Tax Exemption Number: Florida Sales Tax: 85-8013170533C-4

Bidding Costs

St. Johns River State College is not responsible for any cost incurred by bidders in their efforts in submitting this bid.

Open Competition

The College encourages free and open competition among Pre-Qualified Firms. Whenever possible, specifications, bid invitations, and conditions are designed to accomplish this objective, consistent with the necessity to satisfy the College's needs and the accomplishment of a sound economical operation. The Firm's signature on the Bid Checklist/Response Proposal Form guarantees that the Firm, its agents, officers, or employees have not been bribed or attempted to bribe or influence in any way an officer, employee or Agent of the College.

Minority & Women Owned Business Enterprises (M/WBE) Participation

M/WBE participation is encouraged.

Insurance Coverage

Contractor shall obtain, maintain, and pay for insurance in the categories listed in the insurance schedule. The insurance coverage is each category shall meet or exceed the minimum limits set forth in the insurance schedule. St. Johns River State College shall be included as additional named insured on each applicable policy. The insurance shall cover the Firms entire operations under Agreement with the College and shall be effective throughout the effective period of this Agreement. It is not the intent of this schedule to limit the types of insurance otherwise required by this Agreement or that the Firm may desire to obtain.

Minimum Insurance Requirement Schedule

Refer to 00 72 13 Supplementary Conditions For All Insurance Requirements.

Bid Award Process

The bid award shall be made to the lowest and best proposal, Base and Alternates within budget, which meets or exceeds the conditions of the bid specifications and the College reserves the right to award by individual item, groups of items, "All or None" or a combination thereof contingent upon budget availability. The College is not necessarily bound to accept the lowest bid if that bid is contrary to the best interests of the College. St. Johns River State College reserves the right to waive any minor deviations in otherwise valid bid proposal, to waive any informalities, to reject any or all bid proposals, and to accept the bid which will be in the best interest of SJR State. In addition, the College shall have the right to reject any bid not accompanied by data required by the bid specifications, or a proposal in any way incomplete or irregular. Conditional bids will not be accepted. Should the lowest Bidder exceed the proposal budget of the Owner, the Owner may negotiate with the Bidder in order to obtain a bid within budget, including but not limited to College direct purchase of materials.

Bid Rejection

The College shall have the right to reject any or all bids and in particular to reject a bid not accompanied by data required by the bid specifications or a proposal in any way incomplete or irregular. Conditional bids will not be accepted.

Bid Response Materials

The materials submitted in response to this invitation to bid becomes the property of the College upon delivery to the Office of the Director of Capital Contract Management and may be appended to any formal document which would further define or expand the contractual relationship between the College and the successful bidder.

Errors and Omissions

The successful bidder is expected to comply with the true intent of these bid specifications taken as a whole and shall not avail itself of any errors or omissions to the detriment of the services. The successful bidder is responsible for the contents of its proposal and for satisfying the requirements set forth in the bid documents.

Bidder Responsibility

It is understood, and the bidder hereby agrees, that it shall be solely responsible for all services that it proposes, notwithstanding the detail present in the bid specifications.

Cone of Silence

SJR State employees, with the exception of the Director of Capital Contract Management and any exception granted by the Director of Capital Contract Management, and members of the District Board of Trustees are not to be contacted regarding this bid, either directly or indirectly, except as prescribed in section 120.57, Florida Statutes, to discuss the bid or selection process or in an attempt to further their interest in being selected for bid award. Violation of this cone of silence will result in disqualification of the Bidder's bid.

Public Records

To the extent that CONTRACTOR meets the definition of "contractor" under Section 119.0701, Florida Statutes, in addition to other contract requirements provided by law, CONTRACTOR must comply with public records laws, including the following provisions of Section 119.0701, Florida Statutes: Keep and maintain public records required by COLLEGE to perform the service.

Upon request from COLLEGE's custodian of public records, provide COLLEGE with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in chapter 119, F.S., or as otherwise provided by law. Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as

authorized by law for the duration of the contract term and following completion of the contract if the CONTRACTOR does not transfer their records to COLLEGE.

Upon completion of the contract, transfer, at no cost, to COLLEGE all public records in possession of the CONTRACTOR or keep and maintain public records required by COLLEGE to perform the service. If the CONTRACTOR transfers all public records to COLLEGE upon completion of the contract, the CONTRACTOR shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the CONTRACTOR keeps and maintains public records upon completion of the contract, the CONTRACTOR shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to COLLEGE, upon request from COLLEGE's custodian of public records, in a form that is compatible with the information technology systems of COLLEGE. IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS MELISSA MILLER 5001 ST. JOHNS AVE, PALATKA, FL 32177 MELISSAMILLER@SJRSTATE.EDU (386) 312-4106.

THE CONTRACTOR ACKNOWLEDGES THAT SJR STATE CANNOT AND WILL NOT PROVIDE LEGAL ADVICE OR BUSINESS ADVICE TO CONTRACTOR WITH RESPECT TO ITS OBLIGATIONS PURSUANT TO THIS SECTION RELATED TO PUBLIC RECORDS. THE CONTRACTOR FURTHER ACKNOWLEDGES THAT IT WILL NOT RELY ON SJR STATE OR ITS COUNSEL TO PROVIDE SUCH BUSINESS OR LEGAL ADVICE, AND THAT HE HAS BEEN ADVISED TO SEEK PROFESSIONAL ADVICE WITH REGARDS TO PUBLIC RECORDS MATTERS ADDRESSED BY THIS AGREEMENT. THE CONTRACTOR ACKNOWLEDGES THAT ITS FAILURE TO COMPLY WITH FLORIDA LAW AND THIS AGREEMENT WITH RESPECT TO PUBLIC RECORDS SHALL CONSTITUTE MATERIAL BREACH OF THIS AGREEMENT AND GROUNDS FOR TERMINATION.

Sovereign Immunity

St. Johns River State College is a political subdivision of the State of Florida. As such, the College is entitled to sovereign immunity except to the extent of the waiver set forth in 768.28 F.S., the College's performance under any resulting agreement and any amendments there to or attachments connected there with, shall at all times be subject to any and all state laws, state regulations and College District Board of Trustees which are applicable to the College's operations, commitments and/or activities in furtherance of any terms specified therein.

Severability

If any provisions of the agreement resulting from this bid are contrary to, prohibited by, or deemed invalid by applicable laws or regulations of any jurisdiction in which it is sought to be enforced, then said provisions shall be deemed inapplicable and omitted and shall not invalidate the remaining provisions of the agreement.

In the event any provision of this agreement shall be held invalid or unenforceable by a court of competent jurisdiction, or by an administrative hearing officer in accordance with Chapter 120, Florida Statutes, such holding shall not invalidate or render unenforceable any other provision hereof.

Venue

The contract, when entered into and any disputes hereunder, shall be construed in accordance with the laws of the State of Florida and enforced in the courts of the State of Florida. College and Firm hereby agree that venue shall be in Putnam County, Florida.

Americans with Disabilities Act of 1990

If special accommodations are required in order to attend the public meeting to announce bids received, contact the Director of Capital Contract Management at 386-312-4110 or email BeverlyBarker@sjrstate.edu a minimum of three business days prior to the meeting.

Independent Firm

Nothing herein is intended or shall be construed in any way creating or establishing the relation of co-partners between the parties or in any way making the Firm the agent or representative of the College for any purposes in any manner whatsoever. Firm is, and shall remain, an independent Firm with respect to all services performed.

Laws, Ordinances, Rules, Regulations, Permits, and Licenses

The Firm shall observe and obey all laws, ordinances, rules, regulation, and policies of the District Board of Trustees of St. Johns River State College and the federal and state governments which may be applicable to the Firm's operation at St. Johns River State College, and shall, at the sole cost to the Firm, obtain and maintain all permits and licenses necessary to comply with such requirements and standards.

Bid Response Authorization

The bid response shall be signed by a person legally authorized to bind the Firm.

Firm Warranty of Ability to Perform

Firm shall warrant by authorized signature on the bid response that there is no action suit, proceeding, inquiry, or investigation, at law or equity, before or by a court, governmental agency, public board or body, pending or, to the best of the Firm's knowledge, threatened, which would in any way prohibit, restrain, or enjoin the execution or delivery of the Firms obligations, diminish the Firm's obligations or diminish the Firm's financial ability to perform the terms of the proposed contract.

Contract

The successful bidder will enter into a contract with the College based on bid documents and the result of the bid.

Assignment

Neither this agreement nor any duties or obligations under this agreement or resulting contract(s) shall be assigned by Firm without prior written consent of the College.

Indemnification

The firm shall indemnify and hold harmless the College, and any agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or injury to or destruction of tangible property (other than the Work itself) including loss of use resulting therefrom, but only to the extent caused in whole or in part by negligent acts or omissions of the Firm or anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense, is caused in part by a party indemnified hereunder. Such obligations shall not be considered to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist.

Payment

When the Contractor receives payment from the Owner for labor, services, or materials furnished by subcontractors and suppliers hired by the Contractor for the project, the Contractor shall remit payment due to those subcontractors and suppliers, less the value of any items contested in accordance with the Contract, within 10 days after the Contractor's receipt of payment from the Owner. When the payment due the subcontractor is for final payment, including retainage, the subcontractor must include with the invoice for final payment a conditional release of lien and all appropriate warranties and closeout documentation. When the subcontractor receives payment from the Contractor for labor, services, or materials furnished by subcontractors and suppliers hired by the subcontractor, the subcontractor shall remit payment due to those subcontractors, less the value of any item contested in accordance with the contract, within ten (10) days after the subcontractor's receipt of payment.

END OF SECTION

SECTION 00 31 13 GENERAL BID SCHEDULE

St. Johns River State College
BID-SJR-06-2018
Renovation with Addition–Building V, St. Augustine Campus

Bid Web Page Online: **Http://www.sjrstate.edu/062018**	March 15, 2019
Mandatory Pre-Bid Public Meeting & Work Site Visit SJR State St Augustine Campus Room L-112, 2990 College Drive St. Augustine, FL 32084	**March 26, 2019, 2:00 p.m.**
Plans Available to Contractors From: ALEL, LOGAN AND SHAFER, PA, 704 Rosselle St. Jacksonville, FL 32204 (904) 356-2654	March 26, 2019
Electronic Posting on Web Page: Eligible Bidders & Pre-Bid Attendance Register	March 27, 2019
Deadline for Bid Submission: To: Beverly Barker, Director of Capital Contract Management, St. Johns River State College Business Office, 5001 St. Johns Ave. Palatka, FL 32177 • Response must be submitted in sealed envelope and identified on the outside with BID-SJR-06-2018 and the Name of the Respondent	**April 30, 2019, 2:00 p.m.**
Bid Opening: St. Johns River State College Room A-154, 5001 St. Johns Ave. Palatka, FL 32177	**April 30, 2019, 2:30 p.m.**
Electronic Posting on Web Page: Bid Tally & Notice Of Intent To Award (or reject) Bid	May 1, 2019
Protest Period	May 1-3, 2019
Anticipated Award of Bid St. Johns River State College Board of Trustees Meeting 2990 College Drive St. Augustine, FL 32084	May 15, 2019, 3:00 p.m.
Electronic Posting on Web Page: Notice of Bid Award	May 16, 2019
Awarded Contractor: Contract Execution Period Begins	April 16, 2019

The College reserves the right to amend the above schedule.
Schedule changes, if any, will be issued via addendum from the architect.

SECTION 00 41 13 BID CHECKLIST/RESPONSE PROPOSAL FORM

BID CHECKLIST:
Place an "x" on the lines below of the documents attached to this form.

_____ Section 00 43 29 – Drug Free Workplace Form

_____ Section 00 43 31 – Trench Safety Act Certification

_____ Section 00 43 36 – Bid Form Attachment, List of Subcontractors

_____ Section 00 61 00 – Bid Bond Form

RESPONSE PROPOSAL FORM:

PROPOSAL FOR: BID-SJR-06-2018
Renovation with Addition to Building V, St. Augustine Campus, for
St. Johns River State College,
2990 College Drive, St. Augustine, FL, 32084

SUBMITTED BY: _____

QUALIFIER'S NAME: _____

TO: St. Johns River State College, Palatka, Florida

The undersigned Bidder hereby declares that the only person or persons interested in this proposal as Principal is named herein mentioned has an interest in this proposal or in the contract to be entered into; he fully represents his Firm and is authorized to enter into legal agreements; that this Proposal is made freely and without connection with other persons, companies or parties submitting other Proposals; and that this Proposal is in all respects fair and in good faith, without collusion or fraud; and that all parties directly interested in this Proposal are listed herein.

The Bidder further declares that he has examined the site of the Work and informed himself fully in regard to all conditions pertaining to the place where the Work is to be performed; that he has read and examined the Drawings, Specifications and other Contract Documents for the Work and has satisfied himself fully in regard to the Work to be performed and agrees to and by them.

BASE BID PROPOSAL:

The Bidder proposes and agrees to furnish all labor, material and equipment necessary to accomplish the Work in accordance with the Drawings and Specifications for the lump sum price of

_____ Dollars ($ _____)

ALTERNATES:

BID ALTERNATE NO. 1 (Existing Storefront Panel Replacement, Masonry & Misc Finishes Work), ADD:

(+) _____ Dollars ($ _____)

BID ALTERNATE NO. 2 (Addition West & North Walkway Canopy and assoc Sanitary Line Work), ADD:

(+) _____ Dollars ($ _____)

TOTAL OF BASE BID AND ALTERNATES 1 AND 2:

_____ Dollars ($ _____)

CONTRACT TIME:

Bidder proposes and agrees to commence the Work with an adequate force and equipment within seven (7) consecutive days after being notified by the Owner to do so, and shall carry on to a rate to secure Substantial Completion as indicated in the Supplementary Instruction to Bidders and herein: all work thereunder within 300 _ consecutive calendar days; additional Contract Time shall not be granted except by Change Order; this time includes average rain days and holidays and one week between Phase 1/Phase 2A for moving Bookstore, and one week between Phase 2A/Phase 2B for moving Café' and Offices.

The bidder agrees that Liquidated Damages in the amount indicated in the Supplementary Conditions and repeated herein, One Thousand Dollars ($1000.00) for each day the Work remains incomplete, shall be assessed against him if the Work is not completed within the specified time limit,

BID SECURITY:

Bidder agrees that in the case of failure on his part to execute the said Contract and the Performance Bond within ten (10) consecutive calendar days after receiving same, the Bid Security accompanying this Proposal and the monies payable thereon, shall be paid into the funds of St. Johns River State College, Palatka, Florida, as Liquidated Damages for such failure; otherwise the Bid Security accompanying this Proposal may be returned to the undersigned upon award of a contract.

Attached hereto is a certified check on _____
Bank of _____ in the amount of ($_____) or a Bid Bond in an amount not less than five percent (5%) of the bid amount payable to St. Johns River State College, Palatka, Florida. Submit original and copy of Bid Security.

ADDENDA RECEIPT:

Bidder acknowledges below the receipt of Addenda, if any, to Contract Documents.

ADDENDUM _____, DATED_____ ADDENDUM _____, DATED_____

ADDENDUM _____, DATED_____ ADDENDUM _____, DATED_____

ADDENDUM _____, DATED_____ ADDENDUM _____, DATED_____

AUTHORIZING SIGNATURE:_____DATE:_____20____

All companies certify by their signature that they have read and understand the conditions and specifications of the bid and have included all required documents, and that they have the authority, capacity, and capability to perform according to the conditions and specifications of BID-SJR-06-2018

COMPANY NAME: _____

ADDRESS: _____

City, State, Zip: _____

TELEPHONE NUMBER: _____

LEGAL SIGNATURE:_____

PRINTED NAME:_____

TITLE:_____

SUBCONTRACTOR LIST FORM Section 00 43 36.

End of Section

SECTION 00 43 29 DRUG-FREE WORKPLACE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. St. Johns River State College Drug Free Workplace Form is attached. This form must be copied, completed, and submitted with the Contract Documents.

PART 2 – PRODUCTS *Not used*

PART 3 – EXECUTION *Not used*

END OF SECTION

(plus Attachment on following page)

DRUG FREE WORKPLACE PROGRAM FORM

In order to have a drug-free workplace program, a business shall:

1) Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.

2) Inform employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.

3) Give each employee engaged in providing the commodities or contractual services that are under bid a copy of the statement specified in Subsection (1).

4) In the statement specified in Subsection (1), notify the employees that, as a condition of working in the commodities or contractual services that are under bid, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of Chapter 893 or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) days after conviction.

5) Impose a sanction on, or require the satisfactory participation in a drug abuse assistance or rehabilitation program if such is available in the employee's community, by any employee who is so convicted.

6) Make good faith effort to continue to maintain a drug-free workplace through implementation of this section.

AS THE PERSON AUTHORIZED TO SIGN THIS STATEMENT, I CERTIFY THAT THIS FIRM,

_____

(Name of Company)

COMPLIES FULLY WITH THE ABOVE REQUIREMENTS.

Authorized Signature Date

_____ _____

SECTION 00 43 31 TRENCH SAFETY CERTIFICATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. St. Johns River State College Trench Safety Certification Form is attached. This form must be copied, completed, and submitted with the Contract Documents.

PART 2 – PRODUCTS *Not used*

PART 3 – EXECUTION *Not used*

END OF SECTION

(plus Attachment on following page)

TRENCH SAFETY CERTIFICATION FORM

Provide price for trench safety for trench excavations in excess of five (5) feet deep in accordance with the Trench Safety Act, Chapters 90-96, Laws of Florida and OSHA Standard 29 C.F.R. s.1926.650, Subpart P. The Bidder by execution of this Bid Proposal certifies that he will comply fully with the above said Trench Safety Act and OSHA Safety and Health Standards.

The Contractor herein verifies that he is aware of the Trench Safety Act and has in his bid all costs related to the requirement of this Act.

_____

Certified by Contractor

SECTION 00 43 36 BID FORM ATTACHMENT-LIST OF SUBCONTRACTORS

A. Bidder shall identify below those subcontractors, suppliers, manufacturers, etc. that the bidder intends to subcontract with should Bidder be awarded a Contract resulting from this Bid.

1. Indicate each subcontractor, supplier, product or material manufacturer, fabricator or equipment manufacturer by trade or specialty identified on the SUBCONTRACTOR LIST.
2. The Bidder shall also indicate any major division of work performed by Bidder's own forces listed on the SUBCONTRACTOR LIST . Bidder is not intended to perform Work for which he is not legally qualified.

B. Bidders failing to identify on the SUBCONTRACTOR LIST subcontractors, suppliers, product or material manufacturers, equipment manufacturers, fabricators, etc., listed with Name, Address & Telephone Number and license number if applicable may be disqualified & bid rejected.

BID FORM ATTACHMENT- SUBCONTRACTOR LIST			OWN FORCES
DIVISION OF WORK	**PROPOSED SUBCONTRACTOR, LICENSE NUMBER & PRINCIPAL/OFFICER**	**CORPORATE ADDRESS & TELEPHONE NUMBER**	
DEMOLITION			
EARTHWORK/ SITE WORK			
CONCRETE			
MASONRY			
STRUCTURAL STEEL			
WOODWORK/ CABINETRY			
STOREFRONT			
OTHER DOORS			
DOORS HARDWARE			
DRYWALL/STUDS/ ACOUSTICAL CLG			

(Continued on Following Page)

BID FORM ATTACHMENT- SUBCONTRACTOR LIST (Continued from Previous Page)			OWN FORCES
DIVISION OF WORK	PROPOSED SUBCONTRACTOR & PRINCIPAL/OFFICER	CORPORATE ADDRESS & TELEPHONE NUMBER	
LVT FLOORING/ CARPET/ CERAMIC TILE			
PAINTING			
TOILET COMPARTMENTS			
LOUVERS			
HVAC			
PLUMBING			
ACCESS CONTROL			
ROOFING			
ELECTRICAL			

LEGAL SIGNATURE:_____

PRINTED NAME:_____

End of Section

SECTION 00 52 00 AGREEMENT FORM ATTACHMENT

AGREEMENT FORM

AIA Document A101, Standard Form of Agreement Between Owner and Contractor, 2010 version, is the form to be used.
AIA Document A101 may be purchased from the Florida Association of the American Institute of Architects, (AIA Florida), 104 East Jefferson Street, Tallahassee, Florida, tel: 904-222-7590, fax:
904-224-8048, or may be examined at the Architect's office.

End of Section

DRAFT

AIA® Document A101™ – 2007

Standard Form of Agreement Between Owner and Contractor
where the basis of payment is a Stipulated Sum

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

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

« »« »
« »
« »
« »

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

« »« »
« »
« »
« »

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

«SJRState College-Renovation with Addition to ~~s/Remodel~~ Bldg V, St. Augustine Campus»
« »
« »

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

« »« »
« »
« »
« »

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

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

AIA Document A201™–2007, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

TABLE OF ARTICLES

ARTICLE 1 THE CONTRACT DOCUMENTS

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

ARTICLE 2 THE WORK OF THIS CONTRACT

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

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.
(Insert the date of commencement if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

« »

If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner's time requirement shall be as follows:

« »

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

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than « » (« ») days from the date of commencement, or as follows:
(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

« »

Portion of Work	Substantial Completion Date

, subject to adjustments of this Contract Time as provided in the Contract Documents.
(Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)

« »

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be « » ($ « »), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

« »

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

Item	Units and Limitations	Price Per Unit ($0.00)

§ 4.4 Allowances included in the Contract Sum, if any:
(Identify allowance and state exclusions, if any, from the allowance price.)

Item	Price

ARTICLE 5 PAYMENTS

§ 5.1 PROGRESS PAYMENTS

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

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

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the « » day of the « » month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than « » (« ») days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

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

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

§ 5.1.6 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

.1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of « » percent (« » %). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™–2007, General Conditions of the Contract for Construction;

.2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of « » percent (« » %);

.3 Subtract the aggregate of previous payments made by the Owner; and

.4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201–2007.

§ 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

.1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and
(Section 9.8.5 of AIA Document A201–2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)

.2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201–2007.

§ 5.1.8 Reduction or limitation of retainage, if any, shall be as follows:
(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.6.1 and 5.1.6.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)

« »

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

§ 5.2 FINAL PAYMENT

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

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201–2007, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

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

« »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 INITIAL DECISION MAKER

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »
« »
« »
« »

§ 6.2 BINDING DISPUTE RESOLUTION

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201–2007, the method of binding dispute resolution shall be as follows:
(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.)

[« »] Arbitration pursuant to Section 15.4 of AIA Document A201–2007

[« »] Litigation in a court of competent jurisdiction

[« »] Other *(Specify)*

« »

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2007.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

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

« » % « »

§ 8.3 The Owner's representative:
(Name, address and other information)

« »
« »
« »
« »
« »
« »

§ 8.4 The Contractor's representative:
(Name, address and other information)

« »
« »
« »
« »
« »
« »

§ 8.5 Neither the Owner's nor the Contractor's representative shall be changed without ten days written notice to the other party.

§ 8.6 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A101–2007, Standard Form of Agreement Between Owner and Contractor.

§ 9.1.2 The General Conditions are AIA Document A201–2007, General Conditions of the Contract for Construction.

§ 9.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

§ 9.1.4 The Specifications:
(Either list the Specifications here or refer to an exhibit attached to this Agreement.)
« »

Section	Title	Date	Pages

§ 9.1.5 The Drawings:
(Either list the Drawings here or refer to an exhibit attached to this Agreement.)
« »

Number	Title	Date

§ 9.1.6 The Addenda, if any:

Number	Date	Pages

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

§ 9.1.7 Additional documents, if any, forming part of the Contract Documents:

.1 AIA Document E201™–2007, Digital Data Protocol Exhibit, if completed by the parties, or the following:

« »

.2 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201–2007 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)

« »

ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201–2007.
(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201–2007.)

Type of insurance or bond	Limit of liability or bond amount ($0.00)

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

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
« »« »	« »« »
(Printed name and title)	*(Printed name and title)*

SECTION 00 61 00 BID BOND FORM ATTACHMENT

BID BOND FORM

AIA Document A310, Bid Bond, 2010 version, is the form to be used.
AIA Document A310 may be purchased from the Florida Association of the American Institute of Architects, (AIA Florida), 104 East Jefferson Street, Tallahassee, Florida, tel: 904-222-7590, fax:
904-224-8048, or may be examined at the Architect's office.

End of Section

PERFORMANCE AND PAYMENT BOND

AIA Document A312, Performance and Payment Bond, 2010 version, is the form to be used.

AIA Document A101 may be purchased from the Florida Association of the American Institute of Architects, (AIA Florida), 104 East Jefferson Street, Tallahassee, Florida, tel: 904-222-7590, fax:
904-224-8048, or may be examined at the Architect's office.

LABOR & MATERIAL PAYMENT BOND

AIA Document A312, Payment Bond, 2010 version, is the form to be used.

AIA Document A101 may be purchased from the Florida Association of the American Institute of Architects, (AIA Florida), 104 East Jefferson Street, Tallahassee, Florida, tel: 904-222-7590, fax:
904-224-8048, or may be examined at the Architect's office.

End of Section

DRAFT

AIA® Document A312™ – 2010

Performance Bond

CONTRACTOR:
(Name, legal status and address)

« »« »
« »

SURETY:
(Name, legal status and principal place of business)

« »« »
« »

OWNER:
(Name, legal status and address)

« »« »
« »

CONSTRUCTION CONTRACT
Date: « »
Amount: $ « »
Description:
(Name and location)

«SJRSC-Renovation~~s/Remodel~~with Addition to Bldg V, St. Augustine Campus»
« »

BOND
Date:
(Not earlier than Construction Contract Date)
« »
Amount: $ « »
Modifications to this Bond: « » None « » See Section 16

CONTRACTOR AS PRINCIPAL
Company: *(Corporate Seal)*

Signature: _____
Name and Title: « »« »

SURETY
Company: *(Corporate Seal)*

Signature: _____
Name and Title: « »« »

(Any additional signatures appear on the last page of this Performance Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**

« »
« »
« »

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

« »
« »
« »
« »
« »
« »

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

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

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

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

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

- **.1** the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;
- **.2** the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
- **.3** the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

- **.1** After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
- **.2** Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

- **.1** the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
- **.2** additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and
- **.3** liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

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

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

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

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

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

§ 14 Definitions

§ 14.1 Balance of the Contract Price. The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

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

§ 14.3 Contractor Default. Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

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

§ 14.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

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

§ 16 Modifications to this bond are as follows:

« »

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:	« »« »	Name and Title:	« »« »
Address:	« »	Address:	« »

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AIA® Document A312™ – 2010

Payment Bond

CONTRACTOR:
(Name, legal status and address)

« »« »
« »

SURETY:
(Name, legal status and principal place of business)

« »« »
« »

OWNER:
(Name, legal status and address)

« »« »
« »

CONSTRUCTION CONTRACT
Date: « »
Amount: $ « »
Description:
(Name and location)
«SJRSC-Renovation with Addition to ~~s/Remodel~~ Bldg V, St. Augustine Campus»
« »

BOND
Date:
(Not earlier than Construction Contract Date)
« »
Amount: $ « »
Modifications to this Bond: « » None « » See Section 18

CONTRACTOR AS PRINCIPAL
Company: *(Corporate Seal)*

Signature: _____
Name and Title: « »« »

SURETY
Company: *(Corporate Seal)*

Signature: _____
Name and Title: « »« »

(Any additional signatures appear on the last page of this Payment Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or **BROKER:**

« »
« »
« »

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

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

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

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

- **.1** have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
- **.2** have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

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

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

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

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

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

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

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

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

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

§ 18 Modifications to this bond are as follows:

« »

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		**SURETY**	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:	« »« »	Name and Title:	« »« »
Address:	« »	Address:	« »

SECTION 00 72 13 GENERAL CONDITIONS AND SUPPLEMENTARY CONDITIONS

GENERAL CONDITIONS

The General Conditions of the Contract are the American Institute of Architects Standard Document No. A-201-2007, "General Conditions of the Contract for Construction," 2007 Edition, hereinafter referred to as the AIA General Conditions, which document is hereby specifically made a part of the Contract Documents with the same force and effect as though set forth in full.

SUPPLEMENTARY CONDITIONS TO THESE GENERAL CONDITIONS

Section 00 73 00 Supplementary Conditions contains changes and additions to the AIA Document A201, 2007, General Conditions. Where any part of the AIA General Conditions is modified or voided by the Supplementary General Conditions, the unaltered provisions shall remain in effect.

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AMENDED BY THE SUPPLEMENTARY CONDITIONS Section 00 73 00

Section Ends
following AIA Document A201, 2007, 15 Articles, 40 pages

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AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)
«SJRSC-Renovation with Addition to Bldg V, St. Augustine Campus»
« »

THE OWNER:
(Name, legal status and address)
« »« »
« »

THE ARCHITECT:
(Name, legal status and address)
« »« »
« »

TABLE OF ARTICLES

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

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

§ 1.1.2 THE CONTRACT

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

§ 1.1.3 THE WORK

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

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

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

§ 1.1.6 THE SPECIFICATIONS

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

§ 1.1.7 INSTRUMENTS OF SERVICE

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

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

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

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

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

§ 1.3 CAPITALIZATION

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

§ 1.4 INTERPRETATION

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

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

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

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

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

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

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

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or

the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

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

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

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

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

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

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

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

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

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

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

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

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

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

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

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

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

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other

facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

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

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

§ 3.5 WARRANTY

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

§ 3.6 TAXES

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

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

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

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

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

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume

the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

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

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

§ 3.9 SUPERINTENDENT

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

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

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

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

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

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE
The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

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

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

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

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

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

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

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

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

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

required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

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

§ 3.14 CUTTING AND PATCHING

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

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

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

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

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

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

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

§ 3.18 INDEMNIFICATION

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

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

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

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

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

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

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

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION
Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

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

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

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

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

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

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

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

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14-day period shall constitute notice of no reasonable objection.

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

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

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

§ 5.3 SUBCONTRACTUAL RELATIONS

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

be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

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

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

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

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

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that

the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

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

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

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

§ 7.2 CHANGE ORDERS

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

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

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

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

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

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

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

.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

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

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

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

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

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

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

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

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

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

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

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

§ 8.2 PROGRESS AND COMPLETION

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

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

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

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

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

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

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

§ 9.2 SCHEDULE OF VALUES

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

§ 9.3 APPLICATIONS FOR PAYMENT

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

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

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

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

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

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

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

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;

.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a separate contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
.7 repeated failure to carry out the Work in accordance with the Contract Documents.

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

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

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

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

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

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

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

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

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

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect,

stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

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

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

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

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

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

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

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

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

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the

Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such 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 lien, including all costs and reasonable attorneys' fees.

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

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

- **.1** liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents; or
- **.3** terms of special warranties required by the Contract Documents.

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

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

§ 10.2 SAFETY OF PERSONS AND PROPERTY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

§ 10.4 EMERGENCIES

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- **.1** Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- **.2** Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- **.3** Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- **.4** Claims for damages insured by usual personal injury liability coverage;
- **.5** Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- **.6** Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- **.7** Claims for bodily injury or property damage arising out of completed operations; and
- **.8** Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction

of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or

otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the

Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

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

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

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

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

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

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

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

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

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

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

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

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

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

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

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

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

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

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

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

§ 13.6 INTEREST

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

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

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

- **.1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- **.2** An act of government, such as a declaration of national emergency that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

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

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

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

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

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

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

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

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

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

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

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

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

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

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

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a 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 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

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

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

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES
The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

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

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION
§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

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

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

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

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

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

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

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

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

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

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

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

§ 15.4 ARBITRATION

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

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

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

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

§ 15.4.4 CONSOLIDATION OR JOINDER

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

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an

additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

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

SECTION 00 73 00 SUPPLEMENTARY CONDITIONS OF THE CONTRACT

INTRODUCTORY PARAGRAPH

The following supplements, modify, change, delete from or add to the General Conditions of the Contract for Construction, AIA Document A201, 2007. Where a portion of the General Conditions is modified or deleted by these supplements, the unaltered portions of the General Conditions shall remain in effect.

ARTICLE 1 GEVERAL PROVISIONS

1.1.1 THE CONTRACT DOCUMENTS

Sub-Paragraph 1.1.1, line 6, delete the last sentence which reads: "*Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements*". It is the intent of SJR State that the successful Bidder who enters into contract with SJR State can rely on information provided during the Bid period through the Instructions to Bidders, sample forms, and other information furnished by SJR State in anticipation of receiving bids, as consistent with and a part of the Contract Documents for construction.

1.1.3 THE WORK

Add the following sentence to the end of Paragraph 1.1.3

The term "furnish" includes purchase and delivery to Project Site. The term "install" includes receiving, unloading and storing at Project Site, installing in place, and placing in operation or finishing complete for intended use. The term "provide" includes furnishing and installing.

1.1.9 MISCELLANEOUS DEFINITIONS

1.1.9.1 The term "provide" as used in the Project Manual means to furnish and install, complete and ready for intended use.

1.1.9.2 The term "product" as used in the Project Manual includes materials, fabrications, systems and equipment.

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

Add the following subparagraphs to Paragraph 1.2

1.2.4 Should the Drawings and Specifications conflict at any point, the work is to be done according to the Specifications insofar as the quality of materials and workmanship is concerned; but the Drawings shall govern insofar as the form or extent of the work is concerned. Should details and schedules shown on drawings conflict on any point, the schedules prevail. Large-scale details prevail over small-scale plans and elevations, and figure dimensions over scaled dimensions. In case of discrepancies between the various Contract Documents, the order of precedence shall be as follows:

1. Approved Change Orders
2. The Contract Agreement, including Proposal Form
3. Addenda issued during bidding
4. The Supplementary Conditions
5. The AIA General Conditions
6. The Technical Provisions of the Specifications
7. Referenced Standards

1.2.5 The Drawings are intended to show the general arrangements, design and extent of the Work, and are partly diagrammatic; they are not intended to be called for rough-in measurements, or to serve as Shop Drawings.

In general, the better quality or greater quantity of Work or materials shall be furnished unless otherwise indicated in Writing by the Architect.

1.2.6 Where a typical or representative detail is shown on the Drawings, this detail shall constitute the standard in workmanship and materials throughout corresponding parts of the Work; adaptation, however, shall be subject to the approval of the Architect.

1.6 TRANSMISSION OF DATA IN DIGITAL FORMAT

Add the following subparagraph 1.6.1 to Paragraph 1.6

1.6.1 Contractor's Use of Instruments of Service in Electronic Form

.1 The Architect may, with the concurrence of the Owner, furnish to the Contractor versions of Instruments of Service in electronic form. The Contract Documents executed or identified in accordance with Subparagraph 1.5.1 shall prevail in case of an inconsistency with subsequent versions made through manipulatable electronic operations involving computers.

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

ARTICLE 2 OWNER

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

Paragraph 2.2.2: At the end of this paragraph, add the following new text:

As it relates to sanitary sewer and water utility services, the Owner shall pay any applicable capital facilities fees or front footage fees, tap fees, water meters, or other required equipment items related to services provided by the utility entity.

As the scope of this project is for renovation of and addition to the structure of an existing building, Sub-Paragraph 2.2.3 generally does not apply and is revised to read as follows:

"2.2.3 The Owner furnished to the Architect drawings for previous construction additions and remodeling work on Building V, which have been utilized by the Architect in developing the Contract Drawings, that intend to describe physical characteristics, limitations and general utility locations for the Project. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner through these Contract Drawings but shall exercise proper precautions relating to the safe performance of the Work and bring to the attention of the Architect any deviation of existing conditions from the Contract Documents.

2.2.3.1 All grades, lines, levels, and bench marks shall be established and maintained by the Contractor."

Paragraph 2.2.5, delete the text in this paragraph and replace with the following text:

2.2.5 Upon award of the Contract, the Architect will furnish to the Contractor without charge, five (5) sets of Contract Drawings, Specifications and Addenda. The Contractor may obtain additional sets of the above from the Architect, at the cost of printing and handling.

2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

Insert the following after Paragraph 2.4:

2.5 OWNER'S RIGHT CARRY OUT MULTIPLE CONTRACTS OR ACTIVITES

Work shown on the drawings or indicated in the Specifications as "N.I.C." (Not In Contract) or "By Owner" will be performed under separate contracts which may be operating concurrently with the work of this Contract and shall not be included in this Contract.

2.6 OWNER'S RIGHT TO OCCUPY THE COMPLETED WORK

The Owner reserves the right to use and occupy completed portions of the work prior to final acceptance. Such use and occupancy shall not constitute acceptance of any work not completed in accordance with the Contract Documents. See provisions of Sub-Paragraph 9.9."

ARTICLE 3 CONTRACTOR

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

Add the following Clause after Subparagraph 3.2.1

3.2.1.1 Contractor shall ascertain the location of all existing utilities prior to beginning new and alteration work.

Verify locations of utility lines shown on Drawings; locate and mark each utility prior to start of construction. Any damage caused to any utility as a result of Work on this Project shall be promptly repaired or replaced at the sole expense of the Contractor and no additional money will be paid by the Owner.

3.2.1.2 Contractor shall ascertain and verify the location of existing foundations, and other structures shown on drawings to be coordinated with, or that may be present, prior to beginning new and alteration work; locate and mark each foundation, or other structure prior to start of construction. Any damage caused to any foundation or other structure as a result of Work on this Project shall be promptly repaired or replaced at the sole expense of the Contractor and no additional money will be paid by the Owner.

3.2.1.3 Contractor shall verify all grades, lines, levels and dimensions indicated on the drawings, and shall report all inconsistencies before commencing work in that area.

Add the following Subparagraph 3.2.5 to paragraph 3.2

3.2.5 The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for the Architect to evaluate and respond to the Contractor’s requests for information, where such information was available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, or other Owner-provided information, Contractor-prepared coordination drawings, or prior Project correspondence or documentation.

Add the following Subparagraph 3.2.6

3.2.6 Claims for additional compensation or extensions of time because of the failure of the Contractor to field verify proposed and existing Work will not be allowed.

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

Add the following after Subparagraph 3.3.1

.1 The Contractor shall review, verify, and be in agreement with any specified construction or installation procedure and installation prior to performing the Work, including manufacturers recommended and referenced standards, and shall report to the Architect at once if the specified procedure and instruction (1) does not appear to follow reasonable construction practice, (2) may invalidate any specific warranty or general Contractor’s warranty, or (3) may be objectionable to the Contractor for some reason.

3.3.1.2 In conjunction with reporting an objection, the Contractor shall propose, in writing, alternative procedures to which the Contractor will agree and warrant.

3.4 LABOR AND MATERIALS

Delete Subparagraph 3.4.2 and add the following:

3.4.2 After the Contract has been executed, the Owner and Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in the General Requirements (Division 1 of the Specifications). By making requests for substitutions, the Contractor:

.1 represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified.

.2 represents that the Contractor will provide the same warranty for the substitutions that the Contractor would for that specified.

.3 certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's re-design costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and

.4 will coordinate installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

Add the following to Subparagraph 3.4.3

Should the Architect or Owner find any person(s) employed on the project to be incompetent, unfit, or otherwise objectionable for his duties, the Contractor shall immediately cause the employee to be dismissed and said employee shall not be re-employed on this project without the written consent of the Architect and the Owner.

Add the following Subparagraph 3.4.4 to Paragraph 3.4

3.4.4 The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect to evaluate the Contractor's proposed substitutions and to make agreed-upon changes in the Drawings and Specifications made necessary by the Owner's acceptance of such substitutions.

After Paragraph 3.4.4, add the following new paragraph 3.4.5:

3.4.5 The Owner will require of the Contractor that, to the fullest extent possible, preference in the employment of all skilled and unskilled labor, other than the Contractor's key personnel, be given to residents of Putnam, St. Johns and Clay counties when such labor is available and qualified to do the type of work required.

3.5 WARRANTY

After paragraph 3.5, add the following new Subparagraph 3.5.1:

3.5.1 Specific and special warranties specified are in addition to and not in lieu of the Contractor's general warranty.

3.6 TAXES

Add the following to Paragraph 3.6

3.6.1 Contractor shall pay unemployment and Social Security taxes and other taxes imposed by Local, City, State, or Federal government and certify to Owner that this has been done before final payment is made to Contractor.

3.6.2 SJR State reserves the right to implement a sales tax savings program by selecting certain items for Direct Purchase. See Article 16.6 of these Supplementary Conditions.

3.7 PERMITS, FEES AND NOTICES

Delete Subparagraph 3.7.1 and substitute the following:

3.7.1 The Owner shall secure and pay for the building permit and the Contractor shall secure and pay for all other permits, governmental fees, licenses, and inspections necessary for proper execution and completion of the Work which are customarily secured after execution of the Contract and which are legally required when bids are received or negotiations concluded.

Add the following Clause 3.7.1.1 to Subparagraph 3.7.1

3.7.1.1 Contractor shall provide copies of Change Orders to the Building Official and DOE through the Owner and/or Architect.

3.9 SUPERINTENDENT

Add the following Subparagraph 3.9.4 to Paragraph 3.9

3.9.4 The Contractor shall employ a superintendent or an assistant to the superintendent who will perform as coordinator for the mechanical and electrical work. The coordinator shall be knowledgeable in mechanical and electrical systems and capable of reading, interpreting and coordinating Drawings, Specifications, and Shop Drawings pertaining to such systems. The coordinator shall assist the Subcontractors in arranging space conditions to eliminate interference between the mechanical and electrical systems and other work, and shall supervise the preparation of coordination drawings documenting the spatial arrangements for such systems within restricted spaces. The coordinator shall assist in planning and expediting the proper sequence of delivery of mechanical and electrical equipment to the site.

3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

Add the following Subparagraph 3.12.11 to Paragraph 3.12

3.12.11 The Architect's review of the Contractor's submittals will be limited to examination of an initial submittal and two (2) re-submittals. The Architect's review of additional submittals will be made only with the consent of the Owner after notification by the Architect. The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for evaluation of such additional re-submittals.

3.13 USE OF SITE

Add the following Subparagraph 3.12.3 to Paragraph 3.13

3.13.2 The Contractor shall confine his equipment, storage of materials, and operations of his workmen to limits directed by the Architect. Materials shall not be brought onto the site until reasonably required for the progress of the Work. Storage space will be confined to a designated area of the site. When the site is not in a condition to receive a material shipment, the Contractor shall have materials properly stored elsewhere at no additional cost to the Owner. No payment for materials shall be made unless material is stored on site, or other arrangements made in advance such as in a bonded, environmentally controlled warehouse.

3.13.3 Material shall be arranged and maintained in an orderly manner with use of walks, drives, roads and entrances unencumbered. Store, place and handle material and equipment delivered to project site so as to preclude inclusion of foreign substances or causing discoloration. Pile neatly and completely and barricade to protect public from injury. Protect material as required to prevent damage from ground or weather. Should it be necessary to move material at any time, or move sheds or storage platforms, Contractor shall move them as and when required at no additional cost to the Owner. The Owner assumes no responsibility for stored materials in building or on site. The Contractor shall assume full responsibility for damage due to storing of materials. Repairing of areas used for the placing of sheds, offices, and storage of materials shall be done by the Contractor.

3.14 CUTTING AND PATCHING

After paragraph and the following new paragraph 3.14.3:

3.14.3 Existing structures and facilities, including but not limited to buildings, utilities, topography, streets, curbs, sidewalks, landscape materials and other improvements that are damaged or removed due to Contractor's work, shall be patched, repaired, or replaced by the Contractor to the satisfaction of the Architect and authorities having jurisdiction. In the event that local authorities having jurisdiction require that such repairing and patching be done with their own labor and materials, the Contractor shall abide by such regulations and pay for such work.

ARTICLE 4 ARCHITECT

4.2 ADMINISTRATION OF THE CONTRACT

Paragraph 4.2.3, at the end of this paragraph, add the following new text:

If on-site inspections and observations disclose defects and deficiencies, or work not being carried **out in accordance with the Contract Documents, the Architect shall request the Contractor to correct such deficiencies.** If the Contractor fails to take corrective action within a reasonable time, the Architect will notify the Owner in writing with a copy of such notice to the Contractor, calling the Owner's attention to the Contractor's failures to carry out the provisions of the Contract.

At the end of Paragraph 4.2.13, add the following new text to the end of the last sentence:

And, if and when approved by the Owner.

Add the following Clause after Subparagraph 4.2.4:

4.2.4.1 Any direct communication between the Owner and Contractor which may affect the administration or performance of the Contract shall be made or confirmed in writing, with copies to the Architect.

ARTICLE 5 SUBCONTRACTORS

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

In the first sentence of Subparagraph 5.2.1 change the phrase "…as soon as practicable…" to read "…within 10 days…"

ARTICLE 6 CONSTRUCTION BY OWNER OR SEPARATE CONTRACTORS

6.2.6 Claims, disputes and other matters in question between the Contractor and a separate contractor shall be subject to the provisions of Paragraph 4.3, provided the separate contractor has reciprocal obligations. If such separate contractor sues the Owner on account of damages alleged to have been sustained, the Owner shall have the option of defending such proceeding or of notifying the Contractor who shall defend such proceeding and shall pay all costs in connection therewith; and if any judgment against the Owner arises therefrom, the Contractor shall pay or satisfy it, together with the Owner's reasonable costs, including attorney's fees and court costs.

Add the following Subparagraphs to Paragraph 6.2

6.2.7 Project meetings will be held at times designated by the Architect after conference with the Contractor. Contractor and designated Subcontractors must attend these meetings. If the principal of the firm does not attend meetings, the individual representing the firm must be a responsible representative of the company who can bind the company to a decision at the meeting.

6.2.8 Contractor or Contractor's representative shall, on a monthly basis, at a minimum, prepare and present an oral and written report to the Board of Trustees at one of its regularly scheduled meetings. The written report shall be provided to the Board's Secretary ten (10) days in advance of the meeting at which the oral report will be made. The Board may, at its discretion, from time to time, modify this schedule to decrease the frequency of these reports or to modify the form or content of the reports. Such report shall include, as a minimum, a progress report, problem areas, if any, conditions and requests for change orders, and other information as may be requested from time to time by the Owner.

ARTICLE 7 CHANGES IN THE WORK

7.1 GENERAL

Add the following to Paragraph 7.1.3

"The cost of all changes in the Work shall be substantiated by complete itemized statements showing quantities and unit prices for all material, labor (including all fringe benefits), equipment and other items of cost. Cost of labor (including applicable fringe benefits) and materials shall be actual costs to the Contractor. The Contractor shall submit receipts or other evidences, as the Architect may direct, showing his actual costs and his rights to the payment claims."

Add the following Paragraph 7.1.4 and Clauses to Paragraph 7.1

7.1.4 In the maximum percentage of profit and overhead which may be added to actual costs of changes in the Work shall be as follows:

.1 For Work done by his own organization, the Contractor may add ten percent (10%) of his actual costs.
.2 For Work done by Subcontractors, the respective Subcontractor may add ten percent (10%) of their costs and the Contractor and add ten percent (10%) of the above Subcontractor's total
.3 Overhead shall include the following: Supervision, wages or time-keepers, watchmen and clerks, hand tools, incidentals, general office expense, and all other expenses not included in "cost".
.4 Request for Authorizations for changes in the Work shall be made in writing to the Architect and the Owner, and no claim for the revision of the Contract Sum shall be valid unless so authorized.

7.3 CONSTRUCTION CHANGE DIRECTIVES

Paragraph 7.3.7 Delete the first sentence and replace with the following new first sentence:

"If the Contractor does not respond promptly, i.e. within 14 calendar days, or disagrees with the method for adjustment in the Contract Sum, the method and adjustment shall be determined by the Architect on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an allowance for overhead and profit in accordance with the Contract Specifications. Should the response take longer than 14 calendar days, a written explanation of why more time is required must be submitted to the architect."

Paragraph 7.3.7, at the end of this paragraph add the following text

Cost shall not include any of the following:

.6 Salaries or other compensation of the Contractor's personnel at the Contractor's office unless direct additional expenses have been incurred exclusively because of the change;
.7 Expenses of the Contractor's offices, including the field office;
.8 Any part of the Contractor's capital expenses, including interest on the Contractor's capital;
.9 Costs due to the negligence of the Contractor, or any Subcontractor
.10 Overhead, general expense, and the cost of any item not specifically or reasonably inferable as included in the items described in 7.3.6.1 through 7.3.6.5

ARTICLE 8 TIME

Add the following Subparagraphs to Paragraph 8.2

8.2.4 The Contractor shall furnish sufficient forces, construction plant and equipment, and shall work such hours, including night shifts and overtime operations, as may be necessary to ensure prosecution of the work in accordance with the approved progress schedule. If the Contractor falls behind the progress schedule, he shall take such steps as may be necessary or as may be directed by the Architect to improve his progress by increasing the number of shifts, overtime operations, days of work, and the amount of construction plant, as may be required, at no additional cost to the Owner.

8.2.5 Failure of the Contractor to comply with the requirements under this provision shall be grounds for determination that the Contractor is not prosecuting the work with such diligence as will ensure completion within the time specified and such failure constitutes a substantial violation of the conditions of the Agreement.

8.2.6 Upon such determination, the Owner may terminate the Contractor's right to proceed with the work, or any separate part thereof, in accordance with Paragraph 14.2.

8.2.7 Failure to complete the project within the time fixed in the Agreement will result in substantial injury to the Owner, and damages arising from such failure cannot be calculated with any degree of certainty; therefore, if the project is not substantially completed within the time fixed in the Agreement, or within such further time, if any, as shall be allowed for substantial completion, the Contractor shall pay to the Owner liquidated damages for such delay for each and every calendar day elapsing between the date fixed for substantial completion and the date such substantial completion shall have been fully accomplished in accordance with the following:

SCHEDULE OF LIQUIDATED DAMAGES:

One Thousand Dollars ($1,000.00) per calendar day.

8.2.8 Provision for assessment of liquidated damages for delay in no manner affect the Owner's right to terminate the Contract as provided in Article 14 of the General Conditions or elsewhere in the Contract Documents. The Owner's exercise of the right to terminate shall not release the Contractor from his obligation to pay said liquidated damages in the amounts set out in the Agreement.

8.2.9 The Owner may deduct from the balance retained by the Owner under the provisions of Paragraph 9.4.3 any liquidated damages which may have occurred of such portion thereof as the said balance will cover.

ARTICLE 9 PAYMENTS AND COMPLETION

Add the following after Subparagraph 9.1.1

9.1.2 In conformance with the requirements of Section 725.06, Florida Statutes, the specific considerations for the Contractor's promises are:

9.1.2.1 One dollar ($1.00) in hand paid by the Owner, the Architect and the Architect's employees to the Contractor, receipt whereof is hereby acknowledged and adequacy of which the Contractor accepts as completely fulfilling the obligations of the Owner, the Architect and the Architect's employees under the requirements of Section 725.06, Florida Statutes, and;

9.1.1.2 The entry of the Owner and the Contractor into the construction contract because, but not for the Contractor's promises as contained in the Contract Documents, the Owner would not have entered into the construction contract with the Contractor.

9.3 APPLICATION FOR PAYMENT

Add the following Clause to Subparagraph 9.3.1:

9.3.1.3 Until Substantial Completion, the Owner will pay ninety percent (90%) of the amount due the Contractor on account of progress payments

In Subparagraph 9.3.3, change the first sentence to read:

"The Contractor warrants that title to all work and equipment covered by an Application for Payment will pass to the Owner either by incorporation in the construction or upon receipt of payment by the Contractor."

In the second sentence of Subparagraph 9.3.3, delete the words, "to the best of the Contractor's knowledge and belief."
Title to all Work passing to the Owner does not trigger the start of any Warranties, and does not release the Contractor from protection of same, or does not release the Contractor of corrective actions or Work that may be identified during the course of the Work.

9.4 CERTIFICATES FOR PAYMENT

Add the following to Subparagraph 9.4

9.4.3 Ten percent (10%) of each payment will be retained until the Contract, including Change Orders, is substantially complete. Payments of the amounts retained will be due ten (10) days after final acceptance by the Owner and issuance of certificates by the State as described in Paragraph 9.10.1

9.6 PROGRESS PAYMENTS

In the first line of Subparagraph 9.6.3, change the words "The Architect will, upon request…" to read, "The Architect may, on request and at his discretion…"

9.8 SUBSTANTIAL COMPLETION

Add the following Clause 9.8.3.1 to Subparagraph 9.8.3

9.8.3.1 Except with the consent of the Owner, the Architect will perform no more than two (2) inspections to determine whether the Work, or a designated portion thereof has attained Substantial Completion in accordance with the Contract Documents. The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for any additional inspections

9.8.5 Delete the second sentence and substitute the following:

"Upon such acceptance and consent of surety, if any, the Owner shall make payment sufficient to increase the total payments to ninety-five percent (95%) of the Contract Sum, less such amounts as the Architect shall determine for incomplete work and unsettled claims."

9.10 FINAL COMPLETION AND FINAL PAYMENT

Add the following Clauses to Subparagraph 9.10.1:

.1 The Architect will file with the St. Johns River State College Building Official a Request for Final Inspection. Prior to final payment, a Certificate of Final Inspection from the DOE is required in conjunction with the following actions by the Architect.

.2 Except with the consent of the Owner, the Architect will perform no more than two (2) inspections to determine whether the Work, or a designated portion thereof has attained Final Completion in accordance with the Contract Documents. The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for any additional inspections.

Add the following Subparagraph to Paragraph 9.10

9.10.6 Final payment shall be made to the Contractor as provided by the Agreement between the Owner and Contractor. Application for final payment shall be in the same form as application for progress payments as described in Paragraph 9.3.1 and shall be accompanied by the following additional items:

.1 Completed and notarized waivers and releases of lien in a form acceptable to the Architect and Owner (refer to attached Waiver of Lien Certificate).

.2 Certificates of Inspection and Occupancy as required by law

.3 Such other data and substantiating information as may be required elsewhere in these Contract Documents including, but not limited to, all required guarantees, warranties, operating and maintenance manuals, As-Built drawings, or as may be required by the Owner or Architect and as described in DIVISION 1, CLOSEOUT PROCEDURE

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

Add the following after Article 10.4:

10.5 FLORIDA TRENCH SAFETY ACT

10.5.1 The Occupational Safety and Health Administration excavation safety standards, 29CFR 1926.650 Subpart B trench safety standards are in effect during the period of construction of the Project. In compliance with current State of Florida statutes, the Contractor or subcontractor performing trench excavation work on the Project shall comply with the applicable trench safety standards

ARTICLE 11 INSURANCE AND BONDS

Article 11 of the AIA General Conditions as written is deleted in its entirety and is superseded as follows:

11.1 Definitions:

11.1.1 Contractor: As used in this Article 11, is the Contractor and any and all of his Subcontractors, employees, agents and representatives

11.2 Builder's Risk Insurance: Contractor shall purchase, maintain, and pay for the costs of Builder's Risk Insurance (fire, extended coverage, vandalism, theft, and malicious mischief) on all construction materials and

the buildings or structures in the course of construction. Said Builder's Risk insurance shall insure to the benefit of Owner and Owner's interests. Contractor shall be responsible for the loss of, or damage to, any and all of the Contractor's personal property; such as tools, equipment, mobile office, etc.

11.2.1 Extended Coverage: The usual form currently available and covering perils of windstorm, hail, explosive, riot and civil commotion, damage from aircraft and vehicles and smoke damage

11.3 Liability Insurance: The Contractor will purchase and maintain during the entire time of this Agreement comprehensive general liability and comprehensive automobile liability insurance as shall protect him for property damages which may arise from operations under this Agreement whether such operations be by himself or by anyone directly or indirectly employed by him, and the amounts of such insurance shall be the minimum limits as follows:

11.3.1 Comprehensive General Liability including Personal Injury, Products Completed, Operations Coverage, Independent Contractor's Protective, and Contractual Liability

Bodily Injury and Property Damage:

$1,000,000	Each Occurrence
$5,000	Medical Payments (Any one person)
$1,000,000	Personal and Adv. Injury
$2,000,000	General Aggregate
$2,000,000	Products – Comp/OP Aggregate

General Aggregate Limit applies per Product; Products – Comp/OP Aggregate applies per Project; Waiver of Subrogation in favor of Owner

Products and Completed Operations to be maintained for one (1) year after final payment

Property Damage Liability Insurance will provide X, C and U coverage when such contracts are affected. Owner shall be named as additional insured on all liability insurance.

11.3.2 Comprehensive Automobile Liability:

Combined Single Limit Each Accident	$1,000,000 -or-
Bodily Injury per Person	$1,000,000
Bodily Injury per Accident	$2,000,000
Property Damage per Accident	$1,000,000

Owner shall be named additional insured; Waiver of Subrogation in favor of Owner

11.3 Worker's Compensation Insurance: Contractor shall take out and maintain, during the life of this Agreement, Worker's Compensation Insurance in compliance with Chapter 440, Florida Statutes, for all of his employees connected with the work of this project and further, the Contractor shall require his Subcontractors similarly to provide Worker's Compensation Insurance. In case any class of employee engaged in hazardous work under this Contract at the site of the project is not protected under the Worker's Compensation Statute, the Contractor shall provide adequate insurance satisfactory to the Owner for the protection of his employees not otherwise protected

Required Limits:

1. Worker's Compensation – Statutory Benefits
2. Employer's Liability

$1,000,000 each employee	Bodily Injury by Accident
$1,000,000 each employee	Bodily Injury by Disease
$1,000,000 policy limit	Bodily Injury by Disease

Waiver of Subrogation in favor of Owner

11.4 Anything in the Contract Documents to the contrary notwithstanding and in addition to the insurance required to be maintained by the Contractor as hereinabove set forth, Contractor agrees to indemnify, hold harmless and defend Owner and Architect against any and all claims, loss, damage to or destruction of property including, without limitation, property and employees of Owner, occurring wholly or in part, as the result of work done or omitted to be done by, or contracted to be done but not done by, Contractor or his Subcontractors or the employees or agents or invites either arising from injury to or death of persons or damage to or destruction of property due or claimed to be due, in whole or in part, to any negligence or fault of Owner or its employees, agents, or invites, except claims, loss, damage, costs or expense resulting from risks as are hereinabove required to be insured by Owner.

11.5 Contractor shall submit to Owner before commencement of work, evidence of the above required insurance, which shall contain certification by the insurance companies that such insurance shall not be cancelled or materially changes until at least ten (10) days prior to written notification being given to the Owner. The Form of Certificate shall be the standard "Accord" form, Certificate of Insurance. The Contractor shall furnish the Owner copies of any endorsements that are subsequently issued amending coverage or limits

11.6 Anything in Paragraphs 4.18.1, 4.18.2, and 4.18.3 of the General Conditions to the contrary of the indemnification obligations hereby set forth shall not be applicable as between the Owner and Contractor, and any and all references to Owner therein deleted

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

Delete Paragraph 12.2.2 in its entirety and add the following:

12.2.2 If, after the approval of final payments and prior to expiration of one (1) year thereafter, or such longer period of time as may be prescribed by law or the terms of any applicable special guarantee required by the Contract Documents, any work is found to be defective, it shall be repaired by the Contractor. In case of an emergency, brought about by defective work of the Contractor, the Owner may proceed immediately to make the necessary and charge the cost of same to the Contractor without giving any notice to the Contractor.

ARTICLE 13 MISCELLANEOUS PROVISIONS

13.6 INTEREST

Delete Paragraph 13.6.1

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

14.2 TERMINATION BY THE OWNER

Delete Paragraph 14.2.1 in its entirety and add the following:

14.2.1 If the Contractor is adjudged a bankrupt, or makes a general assignment for the benefit for the benefit of creditors, or if a receiver is appointed on account of the Contractor's insolvency, or if the Contractor persistently or repeatedly refuses or fails, except in cases for which extension of time is provided, to supply enough properly skilled workers or proper materials, or fails to make prompt payment to Subcontractors for materials or labor, or persistently disregards laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction, or if the Contractor:

1. Fails to correct, replace and/or re-execute faulty or defective work and/or materials furnished under this Agreement; or
2. Fails to complete or diligently proceed with the Work required by this Agreement, within the time constraints of the construction schedule maintained by the Architect; or
3. Fails to correct or repair any damage to Work caused by him or his failure to protect his Work or the Work of others; or
4. Fails to provide safe and sufficient facilities, orderly premises and the cleanup of the Work required under this Agreement; or
5. Is unable to proceed with the Work because of any action by one or more employees of the Trade Contractor or by a person or labor organization supporting or attempting to represent any employees of the Trade Contractor; or otherwise is guilty of a substantial violation of the provision of the Contract Documents, and fails within 72 hours after receipt of written notice to commence and continue correction

of such default, neglect or violation with diligence and promptness, the Owner, upon certification by the Architect that sufficient cause exists to justify such action, may without prejudice to any other remedy the Owner may have, terminate the employment of the Contractor and take possession of the site and all materials, equipment, tools, construction equipment and machinery thereon owned by the Contractor and may finish the Work by whatever methods the Owner deems expedient. In such case, the Contractor shall not be entitled to receive any further payment until the Work is finished.

ARTICLE 15 CLAIMS AND DISPUTES

Add the following to Paragraph 15.1.4

Unless otherwise provided in the Contract Documents, cost shall be limited to the following: cost of material at the trade discount cost, including sales tax and cost of delivery; cost of labor, including Social Security, unemployment insurance, and fringe benefits required by agreement or custom; Worker's Compensation Insurance, bond premium not to exceed one percent (1%); rental value of equipment and machinery at trade discount cost plus sales tax and the additional cost of supervision directly attributable to the change only if the change (or total time extension of all changes) results in an extension of the contract time for more than thirty (30) days. The bond premium of all credit amounts shall be added to the total credit allowed the Owner. No bond cost shall be allowed for a Subcontractor's bond cost.

Add the following Clauses to Subparagraph 15.1.5

15.1.5.3 Claims for an increase in Contract Time shall set forth in detail the circumstances that form the basis for the claim, the date upon which each cause of delay began to affect the progress of the Work, the date upon which each cause of delay ceased to affect the progress of the Work, and the number of days increase in the Contract Time claimed as a consequence of each cause to delay. The Contractor shall provide such supporting documentation as the Owner may require including, where appropriate, a revised construction schedule indicating all the activities affected by the circumstances forming the basis of the claim.

15.1.5.4 The Contractor shall not be entitled to a separate increase in the Contract Time for each one of the number of causes of delay which may have concurrent delays due to the fault of the Contractor.

ARTICLE 16 – ADDITIONAL CONDITIONS (ADDED ARTICLE)

16.1 MINIMUM WAGE (NOT REQUIRED)

16.2 APPRENTICES AND TRAINEES

16.2.1 The Contractor shall conform to all requirements of Section 466.101 of the Florida Statutes with respect to apprentice and trainee employment

16.3 EQUAL OPPORTUNITY

16.3.1 The Contractor and all Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, or age. The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated fairly during employment without regard to their race, religion, color, sex, national origin, or age. Such action shall include, but not be limited to the following:

16.3.2 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 setting forth the policies of non-discrimination in accordance with local, state and federal guidelines.

16.4 PREFERENCE TO HOME INDUSTRIES

16.4.1 The Contractor agrees that, pursuant to Section §255.04, Florida Statutes, preferences will be given in the purchase of material and in the letting of contracts for the construction of this project to the residents of the State whenever such material can be purchased or services can be employed at no greater expense than that which could be obtained if such purchase was made or contact let to a person or firm doing business beyond

the limits of the State, provided that quality of materials, qualifications, character, responsibility and fitness be equal.

16.5 CODE REQUIREMENTS

16.5.1 All work under this Contract shall be completed in accordance with the Florida Building Code, 2017, 6th Edition, and any/all subsequent addenda, as well as all local, County, State, and Federal laws, codes or requirements.

WAIVER OF LIEN AND CERTIFICATION

St. Johns River State College
Palatka, Florida

KNOW ALL MEN BY THESE PRESENTS, that _____

_____

For and in consideration of _____Dollars, and other good and valuable considerations, lawful money of the United States of America, to me in hand paid, the receipt whereof is hereby acknowledged, does hereby waive, release, remise and relinquish any and all right to claim any lien or liens for work done or material furnished, or any kind of class of lien whatsoever on the following described property:

DATED this _____ day of _____, 20___.

at _____.

BY:_____

TITLE:_____

Sworn to and Subscribed to me this _____ day of _____, 20_____.

_____

NOTARY PUBLIC
MY COMMISSION EXPIRES:

NOTARY SEAL

_____
(Date)

END OF SECTION

SECTION 01 11 00 SUMMARY OF WORK

PART I – GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS & SEQUENCE OF PRIORITIES

BASE BID: The Base Bid shall be a lump sum price for the entire project as required by the contract documents, but not including work indicated or specified to be provided under any of the Alternates described in Section 01 23 00. All work not specifically included in the alternates below shall be included in the Base Bid.

A. Fronting College Drive main entrance, the Project simply described is a street frontage Addition to Existing Building V / Viking Center. Phase One (Ph1) includes construction of the New 5700gsf Addition and 1500gsf Arched Covered Walkway Bid Alternate if able to award. Phase Two includes Remodel/ Renovation of Existing 7500gsf Building V (Ph 2A three-quarters of Existing and Ph2B remaining one-quarter of Existing).

B. Phase One (Ph1) includes construction of New Addition and if within budget Arched Covered Walkway Bid Alternate along W & N edges of Addition. Generally, this new Addition for Bookstore, Community Room/Flex Spaces, Central Receiving includes but is not limited to:

1. Site and building prep/demolition (earthwork, misc utilities, and demolition of existing concrete slab/paver areas, portion of dormer entry, 2 trees and landscape, and associated hauling, dumping); minor patching of existing walls where items removed. Relocated potable water.
2. Addition/New construction: structural system of steel beams, joists, deck, etc. supported on architectural CMU (interior face exposed stucco exterior) and interior column; concrete slab; barrel-tile on sloped roof over main floor area; modified bitumen on low roof section including interior connecting link corridor and over truck dock; stud gyp bd walls; storefront wall and entry systems, wood doors, and steel doors, and hardware incl access control; cabinetry; HVAC equipment installation and associated duct work; Electrical equipment, security, FA, and Lighting systems.
3. Once Addition connecting link roofed-over/dried-in, cut out and rework Existing Building V masonry for new access points into along West wall (consider precision cut through EFIS and CMU to outside face of studs allowing exist studs and gyp to serve as secure closure to exclude any access from Addition: includes temporary construction or permanent frames & doors to Women's, Men's, & Family Toilet Rooms (coordinate operations with Activity Center). May temporarily leave-out slab adjacent to existing West wall at parallel corridor link, until under-slab utilities run for Phase 2; cover with plywd or sim, secured, to allow use during initial portion of Ph2A.

NOTE: With exception of Community Room, all Functional Space areas of Existing Building occupiable and operable such as Truck dock, Mechanical Room, Electric Room, Bookstore, Café, Restrooms, 3 offices, and Activity Area of game tables & lounge and seating.

Immediately upon Beneficial Occupancy of Ph1 / New Addition, College to relocate Bookstore furniture and equipment, misc vending, temporarily ATM, and other Activity Center furniture and equipment.

C. Phase Two-A (Ph2A) includes roughly three-quarters of 7500gsf Exist Building V Remodel/ Renovation: New Café, New Staff Breakroom, 6 New Offices, New Storage, New Accessible stalls in existing Restrooms, New Family Toilet Room, New Activity Center and misc associated spaces. Generally, this includes but is not limited to:

1. At completion of Ph1 and/or start of Ph2A, to accommodate egress within Ph2B requires replacement of existing storefront window with storefront door, as well temporary door into Café food prep area. Construct temporary barrier between Ph2A (north of wall) and Ph2B (south of wall).
2. Demolition of existing walls, ceilings, flooring incl quarry tile at exist break room, misc wall covering removal; demo exist light fixtures, mechanical systems, ductwork; existing steel joists to remain exposed. Minor demo in existing Restrooms for new Accessible stalls, and misc assoc renovation.
3. Upon completion of re-working of under slab utilities, pour existing slab repair and new slab at Addition link.
4. Construction of new gyp bd stud walls; some replacement of exterior storefront and entry systems, and new interior storefront; ACP ceilings in portions plus acoustical ceiling clouds, LVT flooring w/ carpet in office, tile in Family Rest Rm; existing Restrooms minor renov for new Accessible stalls, new accent tile wall and accent tile insert/patching, stall partitions and accessories; cabinetry; wood doors, and steel doors, and hardware incl access control (as well as selective removal, storage, and reinstallation of doors and door hardware); same as Addition HVAC equipment installation and associated duct work, and Electrical equipment, security, FA, and Lighting systems.
5. Some items that may remain incomplete through Phase 2B incl misc ductwork trim-out, floor (LVT), and misc lighting.
6. Plumbing complete (except demo & cap-off at existing Café).

To remain occupiable /operational during Ph1 and Ph2B (Including power/data/security/FA & HVAC fed from Addition): Existing Café, and Existing 3 Offices (Security, Coordinator, and Clubs), and remaining Existing Activity Center space within Phase 2B Limits of Work.

Not operable during Phase 2A Remodel: Staff Break Rm and Restrooms; utilize Library Restrooms through Phase 2A or as soon as available the remodel to create Family Toilet Room and/or existing Men's and Women's Restroom with rebuilt vestibule from Addition and accessible stalls.

Immediately prior to Beneficial Occupancy of Phase 2A Work Limits of Existing Building, relocate specific Café equip. College to relocate Copy and Vending machines, ATM, and various Offices' furniture and equipment.

D. Phase Two-B (Ph2B) includes remaining roughly one-quarter of 7500gsf Exist Building V Remodel/ Renovation for Activity Center. Generally, this includes but is not limited to (and the same type work described in Ph 2A):

1. Demolition of existing 3 Offices and Café walls, ceilings, flooring incl quarry tile at Café, misc wall covering removal; demo exist light fixtures, mechanical systems, ductwork; existing steel joists to remain exposed. Existing gas line to remain operational (Café Hood fire suppression system relocated and gas extended to new location in Ph2A).
2. Construction of new gyp bd stud walls; some replacement of exterior storefront (portions if Bid Alternate 1 within budget); acoustical ceiling clouds, LVT flooring; same as Addition HVAC equipment installation and

associated duct work, and Electrical equipment, security, FA, and Lighting systems.

3. Some items that may remain incomplete until this Phase 2B incl misc ductwork trim-out, floor (LVT) for entire project, and misc lighting.

NOTE: All Functional Space areas operable such as Bookstore, Café, Break Rm, Restrooms, 6 offices; Ph2B scope results in increased Activity Area game tables & lounge and Café seating.

E. ALTERNATES: The alternates listed in Section 01 23 00 affect the scope of the work of this project. Bidder shall include a separate price for each alternate in the Proposal; failure to do so may be sufficient cause to reject the Proposal.

1.02 CONTRACTOR RESPONSIBILITY

A. Coordination of Work

1. The General Contractor and Subcontractors shall review the drawings other specification sections and ascertain requirements in other sections applicable to their work. Each shall be held responsible for coordination and inclusion of the work indicated as if it were in the particular subcontractor's section. The Architect shall be advised of any discrepancies or conflicts within 24 hours of discovery.
2. All subcontractors, suppliers, etc. shall be responsible for knowing what information is given on all sheets of the drawings and specifications concerning his particular work. The failure of the Contractor to provide this notice shall result in a waiver of any claim for any such conflict or discrepancy not timely communicated.

B. All Drawings and all other Sections of the Specifications for requirements applies to this Section.

C. Contract Forms and Requirements

1. The requirement of Division 1 applies to all Divisions and Sections of the Project Manual as if reproduced therein.
2. Forms, requirements and documents included under Division 1 of this Project Manual together with the Table of Contents are a part of the Contract Documents.
3. Drawing sheets as identified on Index to Drawings are a part of the Contract Document.
4. Documents, affidavits, and printed forms included in the Contract Documents are required by the Owner.

1.03 CHANGES

A. No special implication, interpretation, construction, connotation, denotation, import or meaning shall be assigned to any provision of the Contract Documents because of changes created by the issuance of any (1) addendum, (2) amendment, (3) bulletin, (4) notice of deletion, (5) notice of omission, or (6) change order, other than the precise meaning that the Contract Documents would have had if the provision thus created had read originally as it reads subsequently to the (1) addendum, (2) amendment, (3) bulletin, (4) notice of deletion, (5) notice of omission or (6) change order by which it was created.

End of Section

SECTION 01 23 00 ALTERNATES

PART 1 - GENERAL

1.01 SCOPE

A. The alternates listed below affect the scope of the work of this project.

B. Bidder shall include a separate price for each alternate in the Proposal.

C. Failure to do so may be sufficient cause to reject the Proposal.

1.02 BASE BID

A. The Base Bid shall be a lump sum price for the entire project as required by the contract documents, but not including work indicated or specified to be provided under any of the Alternates described below. All work not specifically included in the alternates below shall be included in the Base Bid.

1.03 ADDITIVE BID ALTERNATE 1

A. This alternate shall be a lump sum price to be added to the Base Bid to provide all work indicated in the contract documents as Bid Alternate 1, which generally includes Replacement of four (4) Existing storefront panels with taller panels.

1.02 ADDITIVE BID ALTERNATE 2

A. This alternate shall be a lump sum price to be added to the Base Bid and the Bid Alternate 1, to provide all work indicated in the contract documents as Bid Alternate 2, which generally includes the Arched Walkway Canopy along North and West Addition Elevation.
   a. Associated is the add to relocate the Existing Sanitary Sewer line as indicated on drawings and associated increased protection of existing trees and probable requirement to remove one Oak tree West of Addition and one Oak tree North of Addition.
   b. Note that as a part of the Additive Bid Alt 2 Arched Walkway Canopy, would be the replacement of the +/- 5’ wide walkway with the +/- 7’ walkway. Note: reduces the Base Bid roof system overhang back close to the building face, similar to the Addition East Elevation, incl deck, joists extensions, and tile roof system.

End of Section

SECTION 01 25 13

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. General: Materials, equipment, methods of construction, processes or products, not specifically indicated, may be acceptable to the Owner and the Architect, but shall be approved in writing by the Architect.

1.2 REQUESTS FOR SUBSTITUTION

A. Procedure:
1. After the Notice to Proceed has been issued, the Architect shall consider written requests for substitutions of materials, equipment, methods of construction, processes, products, or other items.
2. Contractor shall submit requests sufficiently in advance to avoid delay of the Work and shall process requests for material substitutions in a timely manner.
3. Contractor shall submit three (3) copies of the request for substitution which shall include the following:
   a. Complete data substantiating compliance of the proposed substitute with the Drawings and Specification.
   b. Proposed product substitution information including:
      1) Product identification; include manufacturer's name.
      2) Manufacturer's literature, including but not limited to product description, marked to indicate specific model, type, size, and options to be considered; performance and test data; reference standards; difference in power demand; and dimensional differences for specified unit.
      3) Names and addresses of similar projects in which product was used, including date of installation and field performance data.
      4) Where substitutions include modifications to other elements of the Work, Contractor shall provide revised design drawings stamped by a Professional Engineer for Architect review.
   c. Proposed methods of construction substitution information including:
      1) Detailed description of proposed method. 2) Drawings illustrating method.
   d. Itemized comparison of proposed substitution with product or method specified.
   e. Data relating to changes in construction schedule.
   f. Relation to separate contracts.
   g. Accurate cost data on proposed substitution in comparison with product or method specified.
4. In making a request for substitution, or in using an approved substitute item, Contractor represents:
   a. Contractor has personally investigated proposed product or method, and has determined that it is equal or superior in all respects to that specified and that it shall perform the function for which it is intended.
   b. Contractor shall provide the same guarantee for the substitute item as for the product or method specified.
   c. Contractor shall coordinate installation of the approved substitution into the Work, to include building modifications if necessary, making such changes as may be required for the Work to be complete in all aspects.
   d. Contractor waives all claims for additional costs related to the substitution which subsequently become apparent.

1.3 CONTRACTOR'S OPTION

A. For products specified only by reference standards, Contractor may select any product meeting standards by any manufacturer and indicate the selected type in the submission.

B. For products specified by naming several products or manufacturers, Contractor may select any product and manufacturer named and indicate the selected type in the submission.

C. For products specified by naming one or more products, but indicating the option of selecting equivalent products by stating "or equivalent" after specified product, Contractor must submit request, as required for substitution, for any product not specifically named.

1.4 ENGINEER'S APPROVAL

A. Substitutions and/or options will not be considered if they are indicated or implied on Shop Drawings or project data submittals without a formal request submitted in accordance with this section.

B. Architect or Engineer shall indicate approval or disapproval of the requested substitution(s) either by separate letter or by endorsement on Contractor's letter of request.

C. Any additional cost incurred by an approved substitution (including engineering costs of redesign) will be at Contractor's expense.

D. Contractor shall obtain Architect's written approval of substitutions prior to ordering materials, equipment, or products for the Work. Should Contractor order such materials, equipment, or products before Architect approves of same, and if they are disapproved by the Architect, all return, reordering and repurchasing costs will be at Contractor's expense.

E. Architect, with timely notice being given by Contractor, shall inspect all substituted materials, equipment or products for conformance with substitution approvals, prior to installation.

F. Architect reserves the right to require substitute items to comply in color and pattern with specified items, if necessary to secure "design intent".

1.5 TRADEMARKS, COPYRIGHTS AND PATENTED DEVICES, MATERIALS, AND PROCESSES

A. It shall be the burden and responsibility of Contractor to determine, before bidding, the existence of any patents, trademarks, or copyrights which are in any way infringed upon by the Drawings and Specifications.

B. Contractor shall include, or be considered as having included in the price or prices in the bid, which becomes a part of the Contract, a sufficient sum to cover all fees, royalties and claims for any material, patent rights, machine, appliance, copyright, trademark, or any arrangement that may be used upon or in any manner connected with or appurtenant to the Work.

C. If Contractor is required or desires to use any design, device, material, or process covered by letters, patents, copyrights, or trademarks, Contractor shall provide for such use by suitable written agreement with the patentee or patent owner, copyright owner, or trademark owner, which agreement shall provide that there will be no future or continuing royalties or payments by Contractor or by Owner. Contractor and the surety shall, at all times, defend, save harmless, and indemnify Owner, local government, Architect, and each of their officers, agents, and employees from and against all such fees, royalties, and claims or suits in connection therewith by reason of any infringement or alleged infringement of such patent rights, copyrights, or trademark rights.

D. Contractor shall pay all applicable royalties and license fees. Contractor shall defend all suits or claims for infringement of any patent rights and save Owner, local government and Architect harmless from loss on account thereof, except that Owner shall be responsible for any such loss when a particular process, design, or the product of a particular manufacturer or manufacturers is specified. However if Contractor has reason to believe that the design, process or product specified is an infringement of a patent, Contractor shall be responsible for such loss unless Contractor promptly gives such information to Architect or Owner.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01 29 00

APPLICATION AND CERTIFICATION FOR PAYMENT

PART 1 – GENERAL

1.1 REQUIREMENTS

A. Applications for Partial Payment and Final Payment shall comply with the requirements of this Section. (See also Section 01 77 00 "Closeout Procedures" for Final Payment requirements).

1.2 DESCRIPTION

A. At least ten (10) days prior to the first Application for Payment, the Contractor shall submit to the Architect, a Schedule of Values allocated to various portions of the Work, prepared in such a form and supported by such data to substantiate its accuracy as the Architect may require. The Schedule of Contract Values will reflect the estimated cost of each subdivision of the Work of each Specification Section. The value of each item shall include a true proportionate amount of the Contractor's overhead and profit. This schedule shall be used as a basis for reviewing the Contractor's Application for Payment. Quantities should be shown as cubic yards, square feet, linear feet, etc. Lump sums should only be used in a few cases. A separate Schedule of Values shall be required for each phase of the Work. A total for all phases shall equal the Contract Sum.

B. The approved form of Schedule of Contract Values will accompany and support each of the Contractor's Certificate of Partial Payment and shall indicate the value of suitably stored materials as well as labor performed and materials incorporated into the Work for each subdivision of the schedule during the period for which the request is prepared.

C. During progress of the Work, the Contractor shall modify the Schedule of Values as approved by the Architect to reflect changes in the Contract Sum due to Change Orders or other modifications of the Contract.

1.3 SUBMITTALS

A. Application for Partial Payment:
1. The Contractor is to make formal submittal of request for payment on Application and Certification for Payment, **AIA Document G702**.
2. Contractor is to submit five notarized copies of the Application and Certification for Payment to the Architect.
3. The Architect will review, approve and sign and seal all five copies of the Application and Certification for Payment. The Architect will certify a payment of ninety percent (90%) of the value of the work and materials suitably stored as noted above, according to his best judgment. The remaining ten percent (10%) shall be retained until job completion and acceptance by the Owner.
4. Architect will distribute Application and Certification for Payment as follows:
   a. One (1) to the Architect
   b. One (1) to the Contractor
   c. Three (3) to the College
5. Each Application and Certification for Payment shall have attached to it one (1) copy of the Schedule of Values. The Schedule of Values form shall be **AIA Document G703**.
6. Payment to the Contractor shall be made as soon as possible after Certificate of Payment is approved and submitted by the Architect, within the Owner's normal administrative procedures, but not more than thirty (30) consecutive days from such approval/submittal.

B. Application for Final Payment:
1. In addition to all of the requirements for partial payment, perform all Work described in Section 01 77 00, "Contract Closeout".

END OF SECTION

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes
1. Construction Documentation.
2. Preconstruction conference.
3. Progress meetings.

B. Related Sections
1. All applicable Sections of Division 01.

1.2 CONSTRUCTION DOCUMENTATION

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
1. Preliminary Construction Schedule.
2. Contractor's Construction Schedule.
3. Submittals Schedule.
4. Daily construction reports.
5. Material location reports.
6. Field condition reports.
7. Special reports.
8. Requests for Interpretations (RFI).

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.

B. Milestone: A key or critical point in time for reference or measurement.

1.4 SUBMITTALS

A. Submittals Schedule: Submit two copies of schedule. Arrange the following information in a tabular format:
1. Scheduled date for first submittal.
2. Specification Section number and title.
3. Submittal category (action or informational)
4. Name of subcontractor.
5. Description of the Work covered.
6. Scheduled date for Engineer’s final release or approval.

B. Preliminary Construction Schedule: Submit two copies.

C. Contractor's Construction Schedule: Submit two copies of initial schedule, large enough to show entire schedule for entire construction period.
1. Submit an electronic copy of schedule, in PDF format, labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.

D. Schedule Reports: Concurrent with Construction Schedule, submit three copies of each of the following reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.

E. Monthly Construction Reports: Submit two (2) copies at monthly intervals.

F. Material Location Reports: Submit two (2) copies at monthly intervals.

G. Field Condition Reports: Submit two (2) copies at time of discovery of differing conditions.

H. Special Reports: Submit two (2) copies at time of occurrence.

1.5 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

1.6 PRECONSTRUCTION CONFERENCE

A. A preconstruction conference shall be scheduled and administered by the entity overseeing the construction (i.e. Developer, Engineer, Construction Manager, etc). Notice to Proceed shall not be issued until a preconstruction conference has been completed.

B. Attendance Required: Each Contractor shall be represented at the preconstruction conference by a person vested with the authority to make necessary decisions on behalf of the Contractor, and such decisions shall commit the Contractor to the agreed procedures, sequence of operations and time schedules. Also attending will be the Owner, and the Architect. Subcontractors and Suppliers are not to attend the preconstruction conference.

C. The Preconstruction Conference Agenda shall include the following discussion points, as applicable:
1. Engineer's Status during Construction.
2. Resident Project Representative (RPR).
3. Project Communications.
4. Contract Times.
5. Access and Rights-of-Way.
6. Permits and Approvals.
7. Field Engineering.
8. Changes in the Work.
9. Work Schedule.
10. Shop Drawings.
11. Substitutions.
12. Job Conference Schedule.
13. Payment Applications.
14. Temporary Utilities.
15. Emergency Phone Numbers.
16. Field Office Facilities.
17. Subcontractors.
18. Prevailing Wage and Payroll Certifications.
19. Insurances.
20. Steel Products Procurement Act Certifications.
21. Safety and OSHA.
22. Control of Work.

1.7 PROGRESS MEETINGS

A. General Contractor shall schedule, administer and record meetings throughout progress of the Work at regular bi-weekly intervals.

B. Attendance Required: Each Contractor shall be represented at such meetings by a person vested with the authority to make necessary decisions on behalf of the Contractor, and such decisions shall commit the Contractor to the agreed procedures, sequence of operations and time schedules. Also attending will be a representative of the Owner and Architect. Subcontractors and Suppliers, as may be appropriate to agenda topics for each meeting.

C. Progress Meeting Agenda:
1. The Contractor is responsible to conduct regular progress meetings at the project site as determined and agreed upon at the Pre-Construction meeting but not less than monthly. Contractor shall notify the Owner, Architect/Engineer of scheduled meeting dates. In addition to the Architect, Owner and Engineer, each subcontractor, supplier or other entity concerned with current progress or involved in planning, coordination or performance of future activities

shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.

2. Meetings shall follow the following guidelines:
   a. General Introduction and distribution of the Attendance Sign In Form:
   b. Review Minutes from Last Meeting:
   c. Action items from previous meeting:
   d. Site Reports:
   e. Safety Report:
   f. Report from Contractor:
   g. Report from Construction Coordinator:
   h. New Business
   i. Review Submittal Log
   j. Review RFI Log
   k. Review Corrective Action Log:
   l. Change Orders:
   m. Review of Progress Schedule:
   n. Review Critical Path Schedule:
   o. Prior Week's Performance:
   p. 2-Week Look-ahead:
   q. Inspection Schedule:
   r. Application for Payment:
   s. Next Meeting Confirmation:
   t. Minutes: No later than 3 days after each progress meeting date, distribute copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
   u. Adjourn to construction area:

PART 2 – PRODUCTS

2.1 SUBMITTALS SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
   1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
   2. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section 01 33 00 in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
   3. Initial Submittal: Submit two copies of complete schedule of all anticipated submittal dates to Engineer within 15 days of Notice to Proceed. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
   4. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule. Update schedule at time of submission of each Application for Payment.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."

B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.
   1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized.
   2. Schedules indicating a Substantial Completion or Final Completion date beyond the established Contract Times shall not be accepted.

C. Activities: Treat each separate area and major process component as a separate numbered activity for each principal element of the Work. Comply with the following:
   1. Submittal Review Time: Include review and resubmittal times as indicated in Division 1 Section 01 33 00 Submittal Schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
   2. Startup and Testing Time: Include not less than seven days for startup and testing.

3. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for the Architect's administrative procedures necessary for certification of Substantial Completion.
4. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
   a. Phasing: Arrange list of activities on schedule by phase.
   b. Work under More Than One Contract: Include a separate activity for each contract. c. Work Restrictions: Show the effect of the following items on the schedule:
      1) Coordination with existing construction.
      2) Limitations of continued occupancies.
      3) Uninterruptible services.
      4) Partial occupancy before Substantial Completion.
      5) Use of premises restrictions.
      6) Provisions for future construction.
      7) Seasonal variations.
      8) Environmental control.
5. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
6. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis to demonstrate the effect of the proposed change on the overall project schedule.

2.3 PRELIMINARY CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Submit preliminary horizontal bar-chart-type construction schedule within fifteen (15) days of date established for the Notice to Proceed.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 60 days of construction.

2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart type, Contractor's Construction Schedule within 30 days of date established for the Notice to Proceed. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project.

B. Schedule Preparation: Prepare a list of all activities required to complete the Work. Identify probable critical paths. Identify first workday of each week with a continuous vertical line.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
   a. Preparation and processing of submittals.
   b. Mobilization and demobilization.
   c. Purchase of materials.
   d. Delivery.
   e. Fabrication.
   f. Utility interruptions.
   g. Installation.
   h. Testing and commissioning.
2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
4. For construction activities that require 3 months or longer to complete, indicate an estimated completion percentage in 10% increments within time bar. Indicate all others in 1% increments.

C. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Owner's or Architect's approval of the schedule.

D. Schedule Updating:

1. Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
    a. Identification of activities that have changed.
    b. Changes in early and late start dates.
    c. Changes in early and late finish dates.
    d. Changes in activity durations in workdays.
    e. Changes in the critical path.
    f. Changes in total float or slack time.
    g. Changes in the Contract Time.

2.5 REPORTS

A. Monthly Construction Reports: Prepare a monthly construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions.
7. Accidents.
8. Meetings and significant decisions.
9. Stoppages, delays, shortages, and losses.
10. Meter readings and similar recordings.
11. Emergency procedures.
12. Orders and requests of authorities having jurisdiction.
13. Change Orders received and implemented.
14. Work Change Directives received and implemented.
15. Clarifications requested, received, and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial Completions and occupancies.
19. Substantial Completions authorized.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.

C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.6 SPECIAL REPORTS

A. Prepare Coordination Memoranda for distribution to each Contractor involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings. Provide copy to the Owner and the Architect.

B. Prepare similar memoranda for the Owner and the Architect and separate contractors where coordination of their work is required. All such memoranda must be provided to the Architect.

2.7 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:

1. Project name.
2. Date.
3. Name of Contractor.
4. Name of Engineer.
5. RFI number, numbered sequentially.
6. Specification Section number and title and related paragraphs, as appropriate.
7. Drawing number and detail references, as appropriate.
8. Field dimensions and conditions, as appropriate.
9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
10. Contractor's signature.
11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
12. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.

C. Hard-Copy RFIs:
1. Identify each page of attachments with the RFI number and sequential page number.

D. Architect’s Action: Architect will review each RFI, determine action required, and return it. Allow seven working days for Engineer's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
   a. Requests for approval of submittals.
   b. Requests for approval of substitutions.
   c. Requests for coordination information already indicated in the Contract Documents.
   d. Requests for adjustments in the Contract Time or the Contract Sum.
   e. Requests for interpretation of Engineer’s actions on submittals.
   f. Incomplete RFIs or RFIs with numerous errors.
2. The Architect's action may include a request for additional information. Engineer's time for response will start again.
3. The Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit claim in accordance with the General Conditions.
   a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within seven days of receipt of the RFI response.

E. On receipt of Architect’s action, immediately distribute the RFI response to affected parties. Review response and notify the Architect within seven days if Contractor disagrees with response.

PART 3 – EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations
3. As the Work progresses, indicate Actual Completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Owner, Architect, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION

SECTION 01 31 19

PROJECT MEETINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This section covers the requirements for attendance at meetings needed for coordination of the project.

1.2 PRECONSTRUCTION CONFERENCE

A. A Preconstruction Conference will be held after NOTICE OF AWARD and before the NOTICE TO PROCEED; the date, time, and location will be determined after NOTICE OF AWARD.

B. The conference shall be attended by:
1. Contractor and Contractor's Superintendent.
2. Subcontractors
3. Architect
4. Owner
5. Others as requested by Contractor, Owner or Architect.

C. Unless previously submitted to Owner, Contractor shall bring the construction schedule, Shop Drawings, and other submittals required by the Contract Documents.

D. The purpose of the Preconstruction Conference is to designate responsible personnel and establish working relationships. Matters requiring coordination will be discussed and procedures for handling such matters established. The agenda will include, but not be limited to, discussion on:
1. Contractor's schedule.
2. Any applicable permit applications.
3. Status of Bonds, insurance, and Contract Documents.
4. Transmittal, review, and distribution of Contractor's submittals.
5. Processing applications for payment. 01 29 00
6. Maintaining record documents.
7. Critical work sequencing.
8. Utility Coordination and Schedule Impacts.
9. Suppliers and Subcontractors.
10. Surveying.
11. Material Testing.
12. Personnel Responsibilities and Communications.
13. Storm Water Management Plan, if applicable
14. Change Order Proposals, Construction Change Directives and Change Orders
15. Use of premises, office and storage areas, staging area, security, and housekeeping.
16. Major product delivery and priorities.
17. Contractor's safety and first aid plan and representative.

1.3 CONSTRUCTION PROGRESS MEETINGS

A. Progress meetings will be conducted at a frequency determined by Architect. These meetings shall be attended by Owner, Architect, Contractor's representative and any others invited by these people.

B. Contractor will conduct the meeting and arrange for keeping the minutes and distributing the minutes to all persons in attendance within three (3) calendar days after the meeting.

C. The agenda will include discussion on construction progress, schedule updates, the status of submittal reviews, the status of requests for information, critical work sequencing, review of strategies for connections into existing facilities, status of Change Order Proposals, and any general business.

1.4 OTHER MEETINGS

A. In accordance with Contract Documents and as may be required by Owner or Architect

END OF SECTION

SECTION 01 33 00

SUBMITTALS

PART 1 – GENERAL

1.1 PROGRESS SCHEDULE

A. Within 15 days of the date established for "commencement of the work," submit a comprehensive progress schedule indicating a time bar for each significant category of work to be performed. Arrange schedule to indicated required sequencing and to show time allowances for submittals, inspections and similar time margins.
   1. Submittal: Provide at least three (3) copies of the schedule to the Architect. Post in the temporary office. Revise at intervals matching payment requests and redistribute.

1.2 PROJECT MEETINGS

A. Conduct bi-weekly progress and coordination meetings attended by representative of each entity engaged for performance of work. Record discussions and decisions. Distribute copies to those attending and others affected, including the Architect and the Owner.

1.3 SCHEDULE OF VALUES

A. Prepare a schedule of values to show breakdown of Contract Sum corresponding with payment request breakdown and progress schedule line items. Show dollar value and percent of total for each unit of work scheduled. Submit not less than 7 days prior to first payment request. Revise each time schedule is affected by change order or other revision.

1.4 PAYMENT REQUEST

A. Submit a request each calendar month. Use AIA form G702, fully completed and executed. Submit at least three (3) originals.
   1. Prior to the initial payment request, submit the schedule of values, a list of principal subcontractors and suppliers, the progress schedule and copies of building permits and similar start-up authorization.

1.5 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

A. General: Coordinate submittals with the progress schedule and actual work progress. Allow 2 weeks for the Architect's review. Provide additional copes as required by governing authorities. Contractor shall review all shop drawings for conformity and completeness prior to submission to the Architect. Shop drawings that are incomplete will be returned for corrections.

B. Shop Drawings:
   1. Initial Submittal: Submit a minimum of **five** opaque blue/black line prints and a minimum of **five** copies of other data required for approval. Two of the submitted copies will be retained by the Architect.

C. Product Data: Mark each copy to indicate the actual product to be provided; show selections from among options in the manufacturer's printed product data. Submit 2 copies to Architect; submittal if for information and record purposes only. Where the product data is required for maintenance manuals, submit with additional copies, which will be returned.
   1. Maintain one additional copy at the project site for reference purpose.
      a. Do not proceed with the installation of manufactured products until a copy of related product data is in the installer's possession at the project site.

D. Samples: Submit 3 sets of samples. Provide 3 or more samples in each set where variations in color, pattern or texture are observable; show average condition and extreme range of variations. Submit full documentation with each set. Sample submittals are for Architect's observation of color, texture, pattern and "kind". Maintain returned set at project site for purposes of quality control comparisons. Samples for color selection shall be:
   1. Actual material samples for the full range of the manufacturers colors line. Incomplete color samples will be returned as “Not Complete”.

1.6 MISCELLANEOUS SUBMITTALS

A. Provide copies, plus additional copies as required for maintenance manual. See Section 01 78 39, Project Record Documents.
   1. Warranties: Submit 2 executed copies, and additional copies as required for maintenance manual. Execution date shall be the Substantial Completion date of that phase of the work.
   2. Field Records: 4 copies, including one copy that will be returned for inclusion in the submittal of record documents.
   3. Maintenance Manuals: Submit 2 bound copies.
   4. Record Drawings: Submit original maintained marked-up prints.

1.7 ARCHITECT'S ACTION

A. Stamp: The Architect/Engineer will stamp each submittal to be returned with a uniform, self explanatory action stamp, appropriately marked and executed to indicate the status of the submittal.

END OF SECTION

SECTION 01 33 01 SUBMITTALS SUPPLEMENTARY PROCEDURES

PART I - GENERAL

1.01 SCOPE

A. This section supplements College Standards for Submittals and includes administrative and procedural requirements for submittals. This section is included for convenience only and is not intended to be all inclusive, requiring examination of all portions of the Contract Documents for complete submittal requirements.

1.02 CONTRACTOR'S CONSTRUCTION SCHEDULE/PROGRESS SCHEDULE

A. Bar-Chart Schedule: Prepare a fully developed, horizontal bar-chart-type, contractor's construction schedule. Submit within 30 days after the date established for commencement of the Work".

1. Provide a separate time bar for each significant construction activity, and briken down in terms of the Phase 1, Phase 2A, and Phase 2B. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the "Schedule of Values".
2. Secure time commitments for performing critical elements for the Work from parties involved.

B. Distribution: Following response to the initial submittal, print and distribute copies to the Architect, Owner, subcontractors, and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.

C. Schedule Updating: Revise the schedule after each meeting, event, or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

1.03 SUBMITTAL SCHEDULE

A. After development and acceptance of the Contractor's Construction Schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days of the date required for submittal of the Contractor's Construction Schedule. Provide the following information:

1. Scheduled date for the first submittal.
2. Related Section number.
3. Name of the subcontractor.
4. Description of the part of the Work covered.
5. Scheduled date for resubmittal.
6. Scheduled date for the Architect's final release or approval.

B. Distribution: Following response to the initial submittal, print and distribute copies of the Architect, Owner, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.

C. Schedule Updating: Revise the schedule after each meeting or activity where

revisions been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

1.04 SCHEDULE OF VALUES

This project should be viewed as one single bid project with three separate construction phases (Phase 1-the Addition, Phase 2A-Renovation of South 2/3rd of the Existing Building, and Phase 2B Renovation of North 1/3rd of the Existing Building). The Building Official will provide a temporary CO at the completion of the first phase of construction to allow the staff and administrators to occupy the Addition.

There should only be one substantial and final completion for the project, in order to control concerns for liquidated damages, if needed. Therefore, when 50 percent of completion for the total contract amount is achieved then the request to reduce the retainage would be considered. Further, the schedule of values should be formatted to reflect the scope of work and material required for each construction phase, to track each separately.

A. Definition: 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.

B. Submit the Schedule of Values to the Architect at the earliest possible date but no later than 7 days before the date scheduled for submittal of the initial Applications for Payment.

C. General Format and Content: Use the Project Manual table of contents as a guide to establish the line items for the Schedule of Values. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.

D. 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 with continuation sheets.
      b. Submittal schedule.
      c. Contractor's construction schedule.
   2. Submit the schedule of values to Architect through Construction Manager at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

E. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the schedule of values and Continuation Sheets G703 as basis. Provide at least one line item for each Specification Section.
   1. Identification: Include the following Project identification on the schedule of values:
      a. Project name and location.
      b. Name of Architect.
      c. Architect's project 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. Related Specification Section or Division.

b. Description of the Work.
c. Name of subcontractor, manufacturer or fabricator, and/or supplier.
d. Change Orders (numbers) that affect value.
e. Dollar value of the following, as a percentage of the Contract Sum to nearest one hundredth percent, adjusted to total 100 percent.
1) Labor
2) Materials.
3) Equipment

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide multiple line items for principal subcontract amounts, where appropriate.
4. Round amounts to nearest whole dollar; total shall equal the value of the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
6. 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.
7. 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 within that amount. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
8. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.05 APPLICATIONS FOR PAYMENT/PAYMENT REQUESTS

A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner. Note also that St. Johns River State College requires the following language in all construction contracts:

"When the contractor receives payment from the owner for labor, services, or materials furnished by subcontractors and suppliers hired by the contractor for the project, the contractor shall remit payment due to those subcontractors and suppliers, less the value of any item contested in accordance with the contract, within 10 days after the contractor's receipt of payment from the owner. When the payment due the subcontractor is for final payment, including retainage, the subcontractor must include with the invoice for final payment a conditional release of lien and all appropriate warranties and closeout documentation. When the subcontractor receives payment from the contractor for labor, services, or materials furnished by subcontractors and suppliers hired by the subcontractor, the subcontractor shall remit payment due to those subcontractors and suppliers, less the value of any item contested in accordance with the contract, within ten (10) days after the subcontractor's receipt of payment."

B. Payment-Application Forms: Use AIA Documents G702 and Continuation

Sheets G703 as the form for Applications for Payments, or other form as approved by the Architect.

C. Application Preparation: Complete every entry on the form. Include notarization and execution by a person authorized to sign legal documents on behalf of the Contractor. The Architect will return incomplete applications without action.
   1. Entries shall match data on the Schedule of Values and the Contractor's Construction Schedule. Use updated schedules if revisions were made.
   2. Include amounts of Change Orders (and Construction Change Directives if incorporated into a Change Order) issued prior to the last day of the construction period covered by the application.
   3. Payment Application Times: the date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.

D. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to the Architect. One copy shall be complete, including waivers of lien and similar attachments, when required.

E. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of mechanics liens from subcontractors, sub-subcontractors and suppliers that have provide Notice to Owner of Intent to File Lien for the construction period covered by the previous application.
   1. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
   2. When an application shows completion of an item, submit final or full waivers.
   3. The Owner reserves the right to designate which entitles involved in the Work must submit waivers.
   4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner and Florida State Statutes.

F. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
   1. List of subcontractors.
   2. Schedule of values
   3. Contractor's construction schedule
   4. Products List
   5. Submittals Schedule
   6. List of Contractor's staff assignments
   7. List of Contractor's principal consultants
   8. Copies of building permits
   9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the work.
   10. Initial progress report
   11. Report of pre-construction conference.
   12. Certificates of insurance and insurance policies
   13. Performance and payment bonds
   14. Data needed to acquire Owner's insurance.

G. 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.
   1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
   2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
   3. Submit Florida Department of Education Certificate of Substantial Completion.

H. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
   1. Evidence of completion of Project closeout requirements.
   2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
   3. Updated final statement, accounting for final changes to the Contract Sum.
   4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
   5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
   6. AIA Document G707, "Consent of Surety to Final Payment."
   7. Evidence that claims have been settled.
   8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
   9. Final liquidated damages settlement statement.

1.06 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with construction schedule. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
   1. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals unit all related submittals are received.

B. Processing: Allow two weeks for initial review. If resubmittal is necessary, process the same as the initial submittal. No extension of contract time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.

C. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the project, Owner’s project number, and the name and address of the entity that prepared each submittal on the label or title block.

D. Submittal Transmittal: Transmit each submittal from the Contractor to the Architect using a transmittal form. The Architect will not accept submittals received from sources other than the Contractor. On the transmittal, indicate relevant specifications section.

E. The Contractor shall thoroughly review all submittals for accuracy and completeness prior to submission to the Architect. All submittals shall bear the Contractor's stamp, signature of reviewer, and date of review. Submittals received without the Contractor's stamp or which have obviously received cursory review (as evidenced by inaccuracies or incompleteness) will be returned without further action by the Architect.

1.07 PRE-CONSTRUCTION SUBMITTALS

A. Submit the following for approval prior to commencing the work.
   1. Surety Letter of Intent to Issue Required Bonds.
   2. Certificates of Insurance.
   3. List of all Subcontractors.
   4. Estimated Schedule of Progress of Construction.
   5. Schedule of Values.
   6. Copy of all Required Building Permits

1.08 SUBMITTALS PRIOR TO FINAL PAYMENT

A. In addition to the above and or in conjunction with requirements of 1.04 H, submit the following for approval prior to final payment.
   1. Submit one set of originals for the following items:
      a. Complete set of record drawings.
   2. Submit three copies with original signature for the following items:
      a. Application for Final Payment.
      b. Final Schedule of Contract Values.
   3. Submit three copies of the following documents:
      a. Consent of Surety to make Final Payment (notarized) on AIA Document G707, "Consent of Surety to Final Payment".
      b. Power of Attorney from Surety for Release of Final Payment.
      c. Satisfactory evidence that the entire work has received final approval of all governing authorities.
      d. Release of Lien from each Sub-Contractor who has filed Notices to Owner.
      h. List of Sub-Contractors including telephone numbers and addresses.
      i. List of attendees from the systems training class(es).
      j. Operations and Maintenance manuals.

1.09 CHANGE ORDER AND PROPOSALS

A. Owner-Initiated Proposal Requests: The Architect will issue a detailed description of Proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time.
   1. Within 2 weeks of receipt of a proposal request, submit an estimate of cost necessary to execute the change to the Architect for the Owner's review. Include a list of quantities of products required and unit costs, with the total amount of purchases to be made.

B. Contractor-Initiated Proposals: When latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect.
   1. Include a statement outlining the reasons for the change and the effect of

the change on the Work. Provide a complete description of the proposed change including cost.

C. Proposed Request Form: Use AIA Document G709 for Change Order Proposal Requests.

D. Allowance Adjustment: For allowance-cost adjustment, base each Change Order Proposal on the difference between the actual purchase amount and the allowance, multiplied by the final measurement of work-in-place.

E. Construction Change Directive: When the Owner and the Contractor disagree on the terms of the Proposal Request, the Architect may issue a Construction Change Directive on AIA Form G714. The Construction Change Directive instructs the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

F. Documentation: Maintain detailed records on a time and a material basis of work required by the Construction Change Directive. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

G. Upon the Owner's approval of a Proposal Request, the Architect will issue a Change Order for signatures of the Owner and the Contractor on AIA Form G701.

1.10 ARCHITECT'S ACTION

A. Shop Drawings are prepared by the contractor, his subcontractor, and his suppliers. Compliance with specified characteristics is the Contractor's responsibility. Approval does not relieve the Contractor of his responsibility for errors and omissions in the shop drawings or compliance with the Contract Documents

B. Action Stamp: The Architect will mark submittals appropriately to indicate the action taken, as follows:
1. "No Exception Taken".
2. "Make Corrections Noted".
3. "Revise and Resubmit".
4. "Rejected".
5. Do not use, or allow others to use, submittals marked "Revise and Resubmit" or "Rejected" at the Project Site or elsewhere where Work is in progress.

C. Unsolicited Submittals: The Architect will return unsolicited submittals to the sender without action.

PART II - PRODUCTS (Not Applicable)

PART III - EXECUTION (Not Applicable)

End of Section

SECTION 01 35 00

SPECIAL PROCEDURES

PART 1 – GENERAL

1.1 PROJECT SCHEDULE

A. The following is a summary of major timeframe events which shall be met by the Contractor. As such the summary does not include all schedules outlined in the Contract Documents it shall not be considered conclusive.

1. Contract Award by St. Johns River State College President; execution by Contractor
   a. Begin equipment procurement and coordination with College provided Equipment.
   b. Submit construction schedule.
   c. Submit schedule of values.
   d. Submit certificate of insurance.
2. A Notice to Proceed with the contract work will be issued by the Owner. No contract time extensions will be granted for failure to provide the required documents within the specified time. The Contractor may begin work activity such as ordering construction materials, processing shop drawings and submittals and scheduling immediately after the award by the College President. The Contract time shall commence from the time specified in the written Notice to Proceed.
   a. Schedule work.
   b. Contract for equipment and materials
   c. Contract with subcontractors
   d. Order materials and equipment
   e. Prepare and submit shop drawings and material samples for approval
   f. Coordination of work and schedule with the Owner's Asbestos Abatement Contractor and Owner's Electrical, HVAC and fire alarm contractors
3. Pre-Construction Conference: To be Determined
4. Start Construction: To be Determined
5. Substantial Completion: within 420 Days from Start of Construction.
6. Final Completion: Fifteen (15) calendar days after Substantial Completion. See Project Schedule

1.2 EARLY OCCUPANCY

A. Where certain portions of the work are completed in advance of the scheduled date, the Owner shall have the right to take possession of and use any such completed or partially completed portions of the work. Such taking possession and use of shall not be deemed as acceptance of any work not completed in accordance with acceptance of any work not completed in accordance with the Contract Documents. Owner, Architect and Contractor shall inspect that portion of the work to determine its status of completion prior to taking possession or use. A certificate of Substantial Completion shall be issued by the Architect to the Contractor which defines the extent of the portion of the work which has been inspected and of which possession is taken or use established.

END OF SECTION

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 – GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements for quality control services.

B. Quality control services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and the Contractor.

C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with Contract Document requirements.

D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.
1. Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.
2. Inspections, test and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with Contract Document requirements.
3. Requirements for the Contractor to provide quality control services required by the Architect, or Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.2 RESPONSIBILITIES

A. Contractor Responsibilities: The Contractor shall provide inspections, tests and similar quality control services, specified in individual Specification Sections and required by governing authorities, except where they are specifically indicated to be the Owner’s responsibility, or are provided by another identified entity.
1. The Contractor shall employ and pay an independent agency, to perform specified quality control services.
2. Retesting: The Contractor is responsible for retesting costs where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility.
   a. Cost of retesting construction revised or replaced by the Contractor is the Contractor's responsibility.
3. Associated Services: The Contractor shall cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the Architect sufficiently in advance of operations to permit attendance of personnel. Auxiliary services required include but are not limited to:
   a. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.
   b. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.
   c. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
   d. Security and protection of samples and test equipment at the Project site.

B. Duties of the Testing Agency: The independent testing agency engaged to perform inspections, sampling and testing of materials and construction specified in individual Specification Sections shall cooperate with the Contractor in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.
1. The agency shall notify the Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.
3. The agency shall not perform any duties of the Contractor.

C. Coordination: The Contractor and each agency engaged to perform inspections, tests and similar services shall coordinate the sequence of activities to accommodate required services with a minimum of delay. In addition the Contractor and each agency shall coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.
   1. The Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.

1.3 SUBMITTALS

A. The Contractor shall submit a certified written report of each inspection, test or similar service, to the Architect, in duplicate.
   1. Submit additional copies of each written report directly to the governing authority, when the Architect so directs.
   2. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to:
      a. Date of issue.
      b. Project title and Architect's job number.
      c. Name, address and telephone number of testing agency.
      d. Dates and locations of samples and tests or inspections.
      e. Names of individuals making the inspection or test.
      f. Designation of the Work and test method.
      g. Identification of product and Specification Section.
      h. Complete inspection or test data.
      i. Test results and an interpretation of test results.
      j. Location of sample or test in project.
      k. Ambient conditions at the time of sample-taking and testing.
      l. Comments or professional opinion as to whether inspected or tested Work complies with Contract Document requirements.
      m. Name and signature of laboratory inspector.
      n. Recommendations on retesting.

1.4 QUALITY ASSURANCE

A. Qualification for Service Agencies: The Contractor will engage inspection and testing service agencies, including independent testing laboratories, which are prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.
   1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.

1.5 TRADESMEN & WORKMANSHIP

A. Ensure that tradesmen performing work at site are skilled and knowledgeable in methods and craftsmanship needed to produce required quality levels for workmanship in completed work. Remove and replace work which does not comply with workmanship standards as specified and as recognized in the construction industry for applications indicated. Remove and replace other work damaged or deteriorated by faulty workmanship or its replacement.

1.6 COORDINATION

A. Coordination: The Contractor shall coordinate construction activities included under various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation.
   1. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.
   2. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.

1.7 REPAIR AND PROTECTION

A. Upon completion of inspection, testing, sample-taking and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in

visual qualities of exposed finishes. Comply with Contract Document requirements for "Cutting and Patching."

B. Protect construction exposed by or for quality control service activities, and protect repaired construction.

C. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

1.8 GENERAL INSTALLATION PROVISIONS

A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.

C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.

D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.

E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.

F. Recheck measurements and dimensions, before starting each installation.

G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

H. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

I. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.

1.9 REPLACEMENT OF WORK

A. Within 24 hours after rejection of work pursuant to the General Conditions, remove all materials and equipment so rejected and immediately replace work, at the Contractor's cost, to the satisfaction of the Architect and the Owner. Should the work of the Owner or other Contractors be damaged by such removal or replacement, the Contractor shall reimburse the Owner or other Contractors for all costs incurred for correcting damage.

END OF SECTION

SECTION 01 41 00

REGULATORY REQUIREMENTS

PART 1 – GENERAL

1.1 WORK WITHIN PUBLIC PROPERTY

A. No work shall be performed within public property until the Contractor has secured from controlling government agency written permission and/or permits and where required furnished bond or guarantee for the accomplishment of such.

1.2 NOTICE OF COMMENCEMENT

A. No work shall be commenced or materials ordered until Notice of Commencement has been recorded in accordance with Chapter 713 Liens, generally Part I, Mechanics' Lien Law, Florida Statute in effect on date of Contract. Contractor shall either record such or ascertain that such has been recorded.

1.3 GOVERNMENT REGULATIONS AND REQUIREMENTS

A. Contractor shall inform himself of and comply with all government regulations and requirements affecting accomplishment of the work.

B. Contractor shall not be responsible for code or government design violations incorporated into the Construction Documents. He shall, however, inform the Architect of observed conflicts in accordance with provisions of Section 00 72 13, General Conditions of the Contract, and shall not proceed with affected work until conflict (if such exists) is clarified or corrected.

1.4 GOVERNING BUILDING CODE

Florida Building Code 2017, including State Requirements for Educational Facilities (SREF), and all subsequent additions, supplements, or subsequent addenda thereto, and any other documents or codes including designated portions of SREF by reference.

1. Florida Building Code, 2017, 6th edition.
2. Florida Fire Protection Code, 2017, 6th edition.
3. Florida Mechanical Code, 2017, 6th edition.
4. Florida Plumbing Code, 2017, 6th edition.
5. Florida Accessibility Code, 2017, 6th edition.
6. National Electric Code (NFPA 70), 2017 edition.

END OF SECTION

SECTION 01 42 00

REFERENCES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. Approved: When used to convey Architect's action on Contractor's submittals, applications, and requests, 'approved' is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract. Any shop or working drawings or material submittals required to be approved for use on the project shall be approved by the Architect of Record.

C. Directed: A command or instruction by the Architect, CQAF, or TxDOT. Other terms including requested, authorized, selected, approved, required and permitted have the same meaning as directed.

D. Indicated: Requirements expressed by graphic representation or in written form on Drawings, in Specifications and in other Contract Documents. Other terms including shown, noted, scheduled and specified have the same meaning as indicated.

E. Regulations: Laws, ordinances, statutes and lawful order issued by authorities having jurisdiction, and rules, conventions and agreements within the construction industry that control performance of the Work.

F. Furnish: Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. Install: Operations at Project site including unloading, temporarily storing, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations.

H. Provide: Furnish and install, complete and ready for intended use.

I. Installer: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application and similar operations. Using a term such as 'carpentry' does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as carpenter. It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

J. Experienced: When used with an entity, 'experienced' means having successfully completed a minimum of five (5) previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

K. Project Site: Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicably of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.

C. Conflicting Requirements: If compliance with two or more standards is specified, and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source and make them available upon request.

E. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers and Web addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities	
	Available from Access Board	(800) 872-2253
	www.access-board.gov	(202)272-5434
CFR	Code of Federal Regulations	
	Available from Government Printing Office	(888)293-6498
	www.access.gpo.gov/nara/cfr	(202) 512-1530
CRD	Handbook for Concrete and Cement	
	Available from Army Corps of Engineers, Waterways Experiment Station	
	www.wes.army.mil	(601)634-2355
FED-STD	Federal Standard (See FS)	
FS	Federal Specification	
	Available from Defense Automated Printing Service	
	www.astimage.daps.dla.mil/online	(215) 697-6257
	Available from General Services Administration	
	www.fss.gsa.gov/pub/fed-specs.cfm	(202) 619-8925
	Available from National Institute of Building Sciences	
	www.nibs.org	(202) 289-7800
FTMS	Federal Test Method Standards (See FS)	
MILSPEC	Military Specifications and Standards	
	Available from Defense Automated Printing Service	(215) 697-6257
	www.astimage.daps.dla.mil/online	
UFAS	Uniform Federal Accessibility Standards	
	Available from Access Board	(800) 872-2253
	www.access-board.gov	(202) 272-5434

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Name, telephone numbers, and Web addresses are subject to change.

AA	Aluminum Association, Inc. (The) www.aluminum.org	(202) 862-5100
AAADM	American Association of Automatic Door Manufacturers www.aaadm.com	(216) 241-7333
AABC	Associated Air Balance Council www.aabchq.com	(202) 737-0202
AAMA	American Architectural Manufacturer's Association www.aamanet.org	(847) 303-5664
AAN	American Association of Nurserymen (See ANLA)	
AASHTO	American Association of State Highway and Transportation Officials www.aashto.org	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists www.aatcc.org	(919) 549-8141
ABMA	American Bearing Manufacturer's Association www.abma-dc.org	(202) 367-1155
ACI	American Concrete Institute/ACI International www.aci-int.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AGC	Associated General Contractors of America (The) www.agc.org	(703) 548-3118
AHA	American Hardboard Association www.ahardbd.org	(847) 934-8800
AHAM	Association of Home Appliance Manufacturers	(202) 872-5955
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.e-architect.com	(202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction www.aitc.glu-lam.org	(303) 792-9559
ALCA	Associated Landscape Contractors of America www.alca.org	(800) 395-2522 (703) 736-9666

ALSC	American Lumber Standards Committee	(301) 972-1700
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANLA	American Nursery and Landscape Association www.anla.org	(202) 789-2900
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
AOSA	Association of Official Seed Analysts	(505) 522-1437
APA	Architectural Precast Association www.archprecast.org	(941) 454-6989
API	American Petroleum Institute www.api.org	(202) 682-8000
ARI	Air Conditioning & Refrigeration Institute www.ari.org	(703) 524-8800
ASCA	Architectural Spray Coaters Association www.ascassoc.com	(609) 848-6120
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	American Society of Mechanical Engineers Intl www.asme.org	(800) 843-2763 (212) 591-7722
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	American Society for Testing and Materials www.astm.org	(610) 832-9585
AWCI	Association of the Wall and Ceiling Industries International www.awci.org	(703) 534-8300
AWCMA	American Window Covering Manufacturers Association (See WCMA)	
AWI	Architectural Woodwork Institute www.awinet.org	(800) 449-8811 (703) 733-0600
AWPA	American Wood Preservers' Association www.awpa.com	(817) 326-6300
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.bia.org	(703) 620-0010

BIFMA	Business and Institutional Furniture Manufacturers Assoc International www.bifma.org	(616) 285-3963
CCC	Carpet Cushion Council www.carpetcushion.org	(203) 637-1312
CCFSS	Center for Cold Formed Steel Structures www.umr.edu/~ccfss	(573) 341-4471
CDA	Copper Development Association, Inc. www.copper.org	(800) 232-2832 (212) 251-7200
CFFA	Chemical Fabrics and Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333
CGA	Compressed Gas Association www.cganet.com	(703) 412-0900
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CPPA	Corrugated Polyethylene Pipe Association www.cppa-info.org	(800) 510-2772 (202) 462-9607
CRI	Carpet and Rug Institute www.carpet-rug.com	(800) 882-8846 (706) 278-3176
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
CTI	Cooling Technology Institute www.cti.org	(281) 583-4087
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
EIA	Electronic Industries Alliance www.eia.org	(703) 907-7500
EIMA	EIFS Industry Members Association www.eifsfacts.com	(800) 294-3462 (770) 968-7945
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
FBC	Florida Building Code www.iccsafe.org	(888) 442-7233
FCI	Fluid Controls Institute www.fluidcontrolsinstitute.org	(216) 241-7333
FGMA	Flat Glass Marketing Association (See GANA)	

FM	Factory Mutual System (See FMG)	
FMG	FM Global www.fmglobal.com	(401) 275-3000
GA	Gypsum Association www.gypsum.org	(202) 289-5440
GANA	Glass Association of North America www.glasswebsite.com/gana	(785) 271-0208
GRI	Geosynthetic Research Institute www.drexel.edu/gri	(215) 895-2343
GTA	Glass Tempering Division of Glass Association of North America (See GANA)	
HI	Hydraulic Institute www.pumps.org	(888) 786-7744 (973) 267-9700
HI	Hydronics Institute www.gamanet.org	(908) 464-8200
HMMA	Hollow Metal Manufacturers Association (See NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	H.P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550
IAS	International Approval Services (See CSA)	
ICEA	Insulated Concrete Repair Institute (The) www.icea.net	(508) 394-4424
ICRI	International Concrete Repair Institute (The) www.irci.org	(703) 450-0116
IEC	International Electro-technical Commission www.iec.ch	(01 41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IESNA	Illuminating Engineering Society of North America www.iesna.org	(212)248-5000
IGCC	Insulating Glass Certification Council www.igcc.org	(315) 646-2234
ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
ISSFA	International Solid Surface Fabricators Association	(702) 567-8150
I3A	International Imaging Industry Association www.pima.net	(914) 698-7603
ITS	Intertek Testing Services www.itsglobal.com	(800) 345-3851 (607) 753-6711

KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690
LMA	Laminating Materials Association www.lma.org	(201) 664-2700
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864 (847) 577-7200
LSGA	Laminated Safety Glass Association (See GANA)	
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MFMA	Maple Flooring Manufacturer's Association www.maplefloor.org	(847) 480-9138
MFMA	Metal Framing Manufacturers Association www.metalframingmfg.org	(312) 644-6610
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MIA	Marble Institute of America www.marble-institute.com	(614) 228-6194
ML/SFA	Metal Lath/Steel Framing Association (See SSMA)	
MPI	Master Painters Institute	(888) 674-8937
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. www.mss.hq.com	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naam.org	(312) 332-0405
NAAMM	North American Association of Mirror Manufacturers (See GANA)	
NACE	National Association of Corrosion Engineers International www.nace.org	(281) 228-6200
NAIMA	North American Insulation Manufacturers Association www.naima.org	(703) 684-0084
NAMI	National Accreditation and Management Institute	(304) 258-5100
NBQA	National Building Granite Quarries Association, Inc.	(800) 557-2848
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NCPI	National Clay Pipe Institute www.ncpi.org	(414) 248-9094
NCTA	National Cable & Telecommunications Association www.ncta.com	(202) 775-3669
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110

NeLMA	Northeastern Lumber Manufacturers Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	International Electrical Testing Association www.netaworld.org	(303) 697-8441
NFPA	National Fire Protection Association www.nfpa.org	(800) 344-3555 (617) 770-3000
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-6372
NGA	National Glass Association www.glass.org	(703) 442-4890
NHLA	National Hardwood Lumber Association www.natlhardwood.org	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NOFMA	National Oak Flooring Manufacturers Association www.nofma.org	(901) 526-5016
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSA	National Stone Association www.aggregates.org	(800) 342-1415 (703) 525-8788
NSF	National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NSSGA	National Stone, Sand & Gravel Association www.nssga.org	(800) 342-1415 (703) 525-8788
NTMA	National Terrazzo and Mosaic Association, Inc. www.ntma.com	(800) 323-9736
NWWDA	National Wood Window and Door Association (See WDMA)	
PCI	Precast/Pre-stressed Concrete Institute www.pci.org	(312) 786-0300
PDCA	Painting and Decorating Contractors of America www.pdca.com	(800) 332-7322 (703) 359-0826
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (508) 230-3516
PGI	PVC Geomembrane Institute www.pvcgeomembrane.com	(217) 333-3929
RCSC	Research Council on Structural Connections www.boltcouncil.org	(800) 644-2400 (312) 670-2400
RFCI	Resilient Floor Covering Institute www.rfci.com	

RIS	Redwood Inspection Service www.calredwood.org	(888) 225-7319 (415) 382-0662
SAE	Society of Automotive Engineers International www.sae.org	(724) 776-4841
SDI	Steel Deck Institute www.sdi.org	(847) 462-1930
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEFA	Scientific Equipment and Furniture Association www.sefalabfurn.com	(516) 294-5424
SGCC	Safety Glazing Certification Council www.sgcc.org	(315) 656-2234
SIGMA	Sealed Insulating Glass Manufacturers Association www.sigmaonline.org	(312) 644-6610
SJI	Steel Joist Institute www.steeljoist.org	(843) 626-1995
SMACNA	Sheet Metal & Air Conditioning Contractor National Association www.smacna.org	(703) 803-2980
SPFA	Spray Polyurethane Foam Alliance www.sprayfoam.org	(800) 523-6154
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	(850) 434-2611
SPRI	Single Ply Roofing Institute	(781) 444-0242
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSMA	Steel Stud Manufacturers Association www.ssma.com	(312) 456-5590
SSPC	Society for Protective Coatings (The) www.sspc.org	(800) 837-8303 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWRI	Sealant, Waterproofing and Restoration Institute www.swrionline.org	(816) 472-7974
TCA	Tile Council of America, Inc. www.tileusa.com	(864) 646-8453
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance www.tiaonline.org	(703) 907-7700
TPI	Truss Plate Institute	(608) 833-5900
TPI	Turfgrass Producers International www.turfgrasssod.org	(800) 405-8873

UL	Underwriters Laboratories, Inc. www.ul.com	(800) 704-4050 (847) 272-8800
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	 (972) 243-3902
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700
WCMA	Window Covering Manufacturers Association (See WCSC)	
WCSC	Window Covering Safety Council www.windowcoverings.org	 (800) 506-4636
WDMA	Window & Door Manufacturers Association www.wdma.com	(800) 223-2301 (847) 299-5200
WIC	Woodwork Institute of California www.wicnet.org	 (916) 372-9943
WMMPA	Wood Moulding & Millwork Producers Association www.wmmpa.com	(800) 550-7889 (530) 661-9591
WWPA	Western Wood Products Association www.wwpa.org	 (503) 224-3930

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CABO	Council of American Building Officials (See ICC)	
IAPMO	International Association of Plumbing and Mechanical Officials (The) www.iapmo.org	 (909) 595-8449
ICBO	International Conference of Building Officials www.icbo.org	(800) 284-4406 (562) 699-0541
ICC	International Code Council www.intlcode.org	 (703) 931-4533
NFPA-70	Electrical Systems	(800) 344-3555
SBCCI	Southern Building Code Congress International, Inc. www.sbcci.org	 (205) 591-1853

C. Federal Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CE	Army Corps of Engineers www.usace.army.mil	
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-0990
DOC	Department of Commerce www.doc.gov	 (202) 482-2000
EPA	Environmental Protection Agency www.epa.gov	 (202) 260-2090

FAA	Federal Aviation Administration www.faa.gov	(202) 366-4000
FDA	Food & Drug Administration www.fda.gov	(888)463-3332
GSA	General Services Administration www.gsa.gov	(202) 708-5082
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
LBNL	Lawrence Berkley National Laboratory www.lbl.gov	(510) 486-5605
NCHRP	National Highway Cooperative Research Program (See TRB)	
NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478
OSHA	Occupational Safety and Health Administration www.osha.gov	(800) 321-6742
PBS	Public Building Service (See GSA)	
RUS	Rural Utilities Service (See USDA)	
TRB	Transportation Research Board www.nas.edu/trb	(202) 334-2934
USDA	United States Department of Agriculture www.usda.gov	(202) 720-2791
USPS	United States Postal Service www.usps.com	(202) 268-2000

END OF SECTION

SECTION 01 42 16

DEFINITIONS AND STANDARDS

PART 1 – GENERAL

1.1 DEFINITIONS

A. General: Except as specifically defined otherwise, the following definitions supplement definitions of the Contract, General Conditions, Supplementary Conditions and other general contract documents, and apply generally to the work.

B. General Requirements: The provisions of Division-1 sections, General Requirements, apply to the entire work of the Contract.

C. Indicated: Shown on drawings by notes, graphics or schedules, or written into other portions of contract documents. Terms such as "shown", "noted", "scheduled" and "specified" have same meaning as "indicated", and are used to assist the reader in locating particular information.

D. Directed, Requested, Approved, Accepted, etc.: These terms imply "by the Architect/Engineer", unless otherwise indicated.

E. Approved by Architect/Engineer: In no case releases Contractor from responsibility to fulfill requirements of contract documents.

F. Project Site: Space available to Contractor at location of project, either exclusively or to be shared with separate contractors, for performance of the work.

G. Furnish: Supply and deliver to project site, ready for unloading unpacking, assembly, installation, and similar subsequent requirements.

H. Install: Operations at project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar requirements.

I. Provide: Furnish and install, complete and ready for intended use.

J. Installer: Entity (firm or person) engaged to install work by Contractor, subcontractor or sub-subcontractor. Installers are required to be skilled in work they are engaged to install.

K. Specification Text Format: Underscoring facilities scan reading, no other meaning, imperative language is directed at Contractor, unless otherwise noted.

L. Overlapping/Conflicting Requirements: Most stringent (generally) requirement written directly into the contract documents is intended and will be enforced, unless specifically detailed language written into the contract documents clearly indicates that a less stringent requirement is acceptable. Refer uncertainties to the Architect/Engineer for a decision before proceeding.

M. Minimum Requirements: Indicated requirements are for a specific minimum acceptable level of quality/quantity, as recognized in the industry. Actual work must comply (within specified tolerances), or may exceed minimums within reasonable limits. Refer uncertainties to Architect/Engineer before proceeding.

N. Abbreviations, Plural Words: Abbreviations, where not defined in contract documents, will be interpreted to mean the normal construction industry terminology, determined by recognized grammatical rules, by the Architect/Engineer. Plural words will be interpreted as singular and singular words will be interpreted as plural where applicable for context of contract documents.

O. Testing Laboratory: An independent entity engaged for the project to provide inspections, tests, interpretations, reports and similar services.

1.2 STANDARDS AND REGULATIONS

A. Industry Standards: Applicable standards of construction industry have same force and effect on performance of the work as if copies directly into contract documents or bound and published

therewith. Standards referenced in contract documents or in governing regulations have precedence over non-referenced standards, insofar as different standards may contain overlapping or conflicting requirements. Comply with standards in effect as of date of contract documents, unless otherwise indicated.

1. Abbreviations: Where abbreviations or acronyms are used in contract documents, they mean the well recognized name of entity in building construction industry; refer uncertainties to Architect/Engineer before proceeding, or consult "Encyclopedia of Associations" by Gale Research Co.

B. Trade Union Jurisdictions: Maintain current information on jurisdictional matters, regulations, actions and pending actions; and administer/supervise performance of work in a manner which will minimize possibility of disputes, conflicts, delays, claims or losses.

END OF SECTION

SECTION 01 45 00

QUALITY CONTROL

PART 1 – GENERAL

1.1 PERFORMANCE OF WORK

A. Except where specifically required otherwise in the technical specifications the Contractor shall be responsible for all construction quality control and shall perform or coordinate all tests and inspections in accordance with Article 13.5 of the AIA General Conditions. See SECTION 01 33 00 – SUBMITTALS

1.2 DEFINITIONS

A. Certified Test Reports: Certified test reports are reports of tests signed by a qualified professional attesting that the test results reported are accurate and that items tested either meet or fail to meet the stated minimum requirements. These test reports include those performed by Factory Mutual, Underwriters Laboratories, Inc., and others.

B. Certified Inspection Reports: Certified inspection reports are those signed by approved inspectors attesting that the items inspected meet the specification requirements other than those exceptions included in the report.

C. Manufacturer's Certificate of Conformance or Compliance: A certificate signed by an authorized manufacturer's official attesting that the material or equipment delivered meets the specification requirements.

1.3 TESTS All testing shall be divided into three categories as follows:

A. Field Tests made at, or in the vicinity of the job site in connection with the actual construction including, but not limited to, concrete batch plants, and similar establishments directly involved in the construction process.

B. Factory Tests, made at the point of manufacture of various products which are shipped to the job site as a unit, including but not limited to such items as transformers, boilers, air conditioning equipment, and electrical equipment.

C. Certified Tests, made by approved testing agencies on material and equipment which are to be incorporated into the structure under the Contract. These tests are such as are performed by Factory Mutual, Underwriters Laboratories, Inc., and others.

1.4 FIELD TESTS

A. Field Tests by the Contractor: The Contractor shall perform certain field testing specifically required of him in the contract specifications. In those cases, he shall furnish all equipment, instruments, qualified personnel, and facilities necessary to perform all tests required by the Contract Documents. Testing services shall be performed by the Contractor or acquired by the Contractor through qualified commercial testing laboratory. If a commercial testing laboratory is retained to perform tests under this contract, all test reports shall be certified by a representative of the testing laboratory who is authorized to sign certified test reports for the laboratory. Test reports shall include the acceptable value for each specification item, the actual test results obtained, and the test methods used. Each report shall be conspicuously stamped on the cover sheet in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements as the case maybe. The Contractor shall arrange for immediate and direct delivery of the signed original of all reports, certifications, and other documentation to the Architect.

B. Factory Tests: The Contractor will arrange for factory tests when such tests are required.

C. Manufacturer's Certified Tests: Certified tests on materials to be incorporated into the work will be acceptable, provided they are performed by the manufacturer or by Government approved agencies or laboratories, show that the materials conform to the specification, and that the tests and certifications meet the requirements of the paragraph entitled "Certificates and Certifications" below.

D. Approval of Laboratories: All laboratory work performed under this contract shall be done by a laboratory approved by the Architect. The basis of approval includes the following:

1. Laboratories performing work in connection with concrete, steel and bituminous materials must conform to American Society for Testing and Materials (ASTM) Designation # 329-77.
2. Laboratories performing work not in connection with concrete, steel and bituminous materials must conform to Sections 3 and 4 of ASTM Designation E 329-77.

1.5 INSPECTION: All inspection shall be divided into two categories as follows:

A. Field Inspection is that inspection in the vicinity of the job site which, when performed properly, will result in the complete compliance of all work-in-place with the contract drawings and specifications.

B. Factory Inspection is that inspection at the point of manufacture of the various products which are shipped to the job site, including but not limited to such items as transformers, boilers, air conditioning equipment, and electrical equipment.

C. Contractor Field Inspection: The Contractor or his designated representative shall inspect all work under this contract.

D. Coating Manufacturer Field Inspection: Contractor shall notify and coordinate manufacturer field inspections for a minimum of one inspection per building elevation.

1.6 SUBMITTALS

A. Submittals shall be prepared in accordance with SECTION 01 33 00 – SUBMITTALS. Each submittal shall be accompanied by a cover letter signed by the Contractor. Each item proposed to be incorporated into the Contract shall be clearly marked and identified in the submittals, and shall be cross-referenced to the contract drawings and specifications so as to identify clearly the use for which it is intended. Each sheet of submittal shall be stamped with the Contractor's certification stamp. Data submitted in a bound volume or on one sheet printed on two sides may be stamped on the front of the first sheet only. The Contractor's certification stamp shall be worded as follows:

B. "It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into the project. It is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for the Architect's review.

Certified by: _____ Date: _____ "

C. The person signing the certification shall be one designated in writing by the Contractor as having that authority. The signature shall be in original ink. Stamped signatures are not acceptable.

D. Submittal Status Logs: The Contractor shall maintain at the job site an up-to-date submittal status log showing the status of submittals required by the contract.

E. Shop drawings, manufacturer's data and samples shall be identified clearly and submitted in accordance with the General Conditions.

F. Certified Test Reports: Before delivery of materials and equipment, certified copies of the reports of all tests listed in the technical sections shall be submitted and approved. The testing shall have been performed in a laboratory meeting the requirements specified herein. Test reports shall be accompanied by certificates from the manufacturer certifying that the material and equipment proposed to be supplied is of the same type, quality, manufacture, and make as that tested.

G. Scaffolding and Erection Procedures Certification: The Contractor is required to submit a design or certification for scaffolding and erection procedures daily inspection report must indicate that the work has been inspected for conformance to the design or certification. A specific statement for these items rather than a general statement is required.

1.7 CERTIFICATES AND CERTIFICATIONS

A. Manufacturer's certification may be furnished by the Contractor, on items of materials and equipment incorporated into the work, only when this method will assure full compliance with the provisions of the Contract, as determined by the Architect. Pre-printed certifications will not be acceptable. All certifications shall be in the original. The original of all manufacturer's certifications shall name the appropriate item of equipment or material, specification, standard or other document specified as controlling the quality of that item of equipment or material, specification, standard or

other document specified as controlling the quality of that item and shall have attached thereto certified copies of test reports upon which the certifications are based.

1.8 RECORD OF INSPECTIONS

A. Pursuant to the Contractor's Inspection, the Contractor shall maintain, on a day-to-day basis, a record of all inspections and field tests performed that day.

1.9 REPEATED TESTS AND INSPECTIONS

A. The Contractor shall repeat tests and inspections after each correction made to nonconforming materials and workmanship until tests and inspections indicate the materials, equipment, and workmanship conform to the Contract requirements. The retesting and re-inspections shall be performed at no cost to the Owner.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.1 DURATION

A. All facilities required as part of this section shall be provided and maintained for duration of project or as specifically required.

1.2 TEMPORARY UTILITIES

A. The Contractor is responsible for the following:
1. Temporary telephone service. (Contractor's option)
2. Temporary field offices. (Contractor's option)
3. Temporary toilets, including disposable supplies.
4. Temporary wash facilities, including disposable supplies.
5. Drinking water.
6. Temporary daily janitorial services.
7. Construction aids and miscellaneous services and facilities.
8. Barricades, warning signs and lights.
9. Security enclosure and lockup.
10. Environmental protection.
11. Temporary electric and water will be furnished by owner, from the existing facilities.

1.3 BARRIERS

A. Contractor shall provide as needed or required and comply with applicable governmental requirements for barricades, lighting, marking, flagmen, etc., to protect work, property and persons.

B. Dust proof partitions shall be provided during demolition and renovation construction activity and at other times as required to prevent spread of dust and debris into other areas of the Administration Building where no work is scheduled and other areas of the building.

1.4 TEMPORARY CONTROLS

A. Environmental Requirements: Comply with all governmental requirements as such affects work hereunder.

B. Noise: Construction noise shall be kept to a minimum.

C. Debris Control: Keep premises clean and free from accumulation of debris and rubbish. Provide trash and debris receptacles and require use. Remove from construction site daily.

1.5 PROJECT SAFETY

A. Contractor shall comply with all applicable governmental and insuring company requirements relative to construction and project safety. Either the Superintendent, or other company representatives shall be on the site during all working hours. This person, and the Superintendent shall be trained in project safety and designated as Contractor's Safety Directors.

END OF SECTION

SECTION 01 56 00

TEMPORARY BARRIERS AND ENCLOSURES

PART I - GENERAL

1.1 SUMMARY

A. Use of Barriers and Enclosures: The Contractor shall furnish, erect and maintain temporary barriers, barricades, enclosures, and temporary construction fencing as required for the following:
   1. To protect the health and safety of occupants and the general public from exposure to immediate physical harm as well as to noise, dust, and fumes. Note that this Section does not provide minimum requirements related to Indoor Air Quality.
   2. To protect new and pre-existing adjacent construction from exposure to physical damage, dust, dirt, and water.
   3. To provide security of valuable property.
   4. To protect trees and plants.

1.2 RELATED SECTIONS

A. Section 01 56 39, Protection of Trees and Shrubs

PART 2 - PRODUCTS

2.1 GENERAL FABRICATION

A. Substantial Construction: Barriers and enclosures shall be of adequately substantial construction to serve their purpose without failure throughout the duration of their use. Materials may be new or used, suitable for the intended purpose, but shall not violate requirements of applicable codes and standards.

B. Rigid Fencing: The general public, as well as adjacent lawns and plantings, shall be protected from harm by the installation of continuous, durable, rigid fencing at the limit lines of each construction area.

C. Tree Protection: Existing trees that are adjacent to a construction site shall be protected from damage by the installation of durable, rigid 6’ high fencing at the drip line of each tree.

PART 3 - EXECUTION

3.1 BASIC REQUIREMENTS

A. Install facilities of a neat and reasonable uniform appearance, structurally adequate for required purposes.

B. Install barriers and enclosures so as to not create new hazards such as tripping or protrusions that might be a source of safety concern to pedestrians or passers by.

C. Establish reasonable alternative access when necessary due to placement of barriers.

D. Maintain barriers during entire construction period.

E. Relocate barriers as required by progress of construction.

3.2 TREE AND PLANT PROTECTION REQUIREMENTS

A. Preserve and protect existing trees and plants at site which are designed to remain, and those adjacent to site.

B. Consult with Architect and the Owner for removal of agreed-on roots and branches which interfere with construction.
   1. Employ a qualified tree surgeon to remove, and to treat cuts.

C. Provide temporary barriers to a height of six feet, around each, or around each group, of trees and plants. The barriers shall be placed at the drip line of each tree.

D. Protect root zones of trees and plants:
   1. Do not allow vehicular traffic or parking.
   2. Do not store materials or products.
   3. Prevent dumping of refuse or chemically injurious materials or liquids.
   4. Prevent puddling or continuous running water.

E. Carefully supervise excavating, grading and filling, and subsequent construction operations, to prevent damage.

F. Replace, or suitably repair, trees and plants designated to remain which are damaged or destroyed due to construction operations. Any damage and any necessary replacements will be evaluated by licensed horticulturists.

3.3 REMOVAL

A. Completely remove barricades, including foundations, when construction has progressed to the point that they are no longer needed, and when approved by the Owner or Architect

B. Clean and repair damage caused by installation, fill and grade areas of the site to required elevations and slopes, and clean the area.

END OF SECTION

SECTION 01 56 39

TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Contractor shall protect and avoid damaging existing trees, landscape, wetlands, and adjacent vegetation.

1.2 SUBMITTALS

A. Contractor shall submit a plan for onsite haul of materials prior to construction.
   1. The plan should include points of access to and from the site and show a workable system of onsite haul routes that protect existing landscaped and wetland areas.
   2. The plan shall be submitted to Architect for review and comment prior to the commencement of Work. Architect will discuss the plan with Owner and Contractor to ensure protection of existing vegetation, but shall not dictate haul routes or construction methods to Contractor.

B. Contractor shall submit product data and plan showing proposed location of any protective barriers proposed to limit unintentional access for tress or other existing vegetation designated for protection.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 GENERAL

A. Contractor shall erect protective fencing if, in the opinion of the Architect, there is risk of damage caused by construction operations.

B. Vehicular and pedestrian traffic shall be limited to areas marked. Through traffic and stock piling of equipment and materials are not permitted within marked areas.

C. No construction roads are to be created within the drip lines of any trees or other vegetation designated to be saved without approval of Architect.

3.2 PROTECTED AREAS

A. Protected areas will be designated on the Drawings and identified in the field, one time, by Architect. Contractor shall adequately mark areas.
   1. No access of construction vehicles or workers on foot is permitted through protected areas.
   2. No material shall be stockpiled and no equipment shall be parked or repaired within these areas.

3.3 TREES AND PLANTINGS

A. Trees and vegetation to be saved that do not fall within the limits of protected areas will be designated one time in the field by Architect.

B. Trees designated to be preserved, but are within the limits of construction, shall be protected from damage associated with construction.
   1. A sturdy, physical barrier (florescent orange in color) shall be fixed in place around each tree for the duration of construction.
      a. Barrier shall be placed no closer than six (6) feet from the trunk, or one-half of the drip line, whichever is greater.
      b. Barrier shall be fixed so it cannot be moved easily; but the material can be flexible, such as orange snow fence attached to T-posts driven into the ground, and shall act as an effective deterrent to deliberate or accidental damage of each tree.
      c. The movement or storage of equipment, material, debris, or fill within these required protective barriers is completely prohibited.

3.4 DAMAGE TO EXISTING VEGETATION

A. Any trees damaged during construction shall be immediately repaired by a tree surgeon acceptable to the Architect at the Contractor's expense.

B. Any tree judged by the accepted tree surgeon to be damaged beyond repair shall be removed at Contractor's expense.

C. For each tree erroneously removed or damaged beyond repair, an assessment will be immediately withheld from Contractor's progress payments.
   1. This assessment will be equal to the value of the tree prior to damage.
   2. This assessment will be determined by a tree appraiser, selected by Owner and paid for by Contractor.
   3. The cost for hiring a tree appraiser shall also be withheld from Contractor's progress payments.

D. Contractor shall replace each damaged tree with nursery-grown material of similar size and of the same or approved species.
   1. Replacement trees shall be the greater of a two (2)-inch caliper or size equivalent to the size of the damaged tree, balled and burlapped, and planted in accordance with the provisions outlined in these Specifications.

E. Contractor shall pay an assessment if Architect determines that Contractor has disturbed any grasses, shrubs and/or cattails located within the protected areas.
   1. This assessment will not exceed two dollars ($2) per square foot of disturbance, and will be immediately withheld from Contractor's progress payments.

F. Damaged vegetation shall be replaced by Contractor with an equal value per square foot of damage.
   1. Replacements shall be planted in accordance with the provisions outlined in Section 32 92 00, Turf and Grasses, and Section 32 93 00, Plants, of these Specifications.

END OF SECTION

SECTION 01 57 13

TEMPORARY EROSION AND SEDIMENTATION CONTROLS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Contractor using Best Management Practices (BMPs) in preparing, furnishing, installing, maintaining and removing temporary erosion and sedimentation controls.

1.2 RELATED SECTIONS

A. Section 01 33 00: Submittals

B. Section 01 35 35: Water Pollution Control.

C. Section 01 40 00: Quality Requirements

D. Section 01 57 19: Temporary Environmental Control

E. Section 03 00 00: Concrete

F. Section 04 22 00: Concrete Unit Masonry

G. Section 06 10 00: Rough Carpentry

1.3 QUALITY ASSURANCE

A. Comply with Quality Requirements (see 1.2 above).

1.4 SUBMITTALS

A. Refer to Section 01 33 00 – Submittals, for submittal requirements and procedures.

B. Description and Working Drawings of BMPs for temporary erosion and sedimentation controls. Describe sequences and methods of installing controls. Indicate controls which will ensure storm water drainage from areas to be stripped or modified will not reach velocities that result in erosion of the soil and that storm water discharges are free of silt, trash and other contaminants. Discharges shall comply with requirements of Section 01 57 19 – Temporary Environmental Control and Section 01 35 35 Water Pollution Control. Show final grading plan. Have proposed controls accepted by Engineer or Owner before starting earthwork operations. Secure grading permits before grading.

C. Manufacturer's product data.

D. Material Safety Data Sheets (MSDS): Manufacturer’s Material Safety Data Sheets for each type of material used in work.

1.5 DEFINITIONS

A. BMPs for temporary erosion controls: Consist of temporary grading, grassing, mulching, hydromulching, applying netting, watering and reseeding sloped surfaces, providing berms at top of slopes, and providing interceptor ditches at ends of berms and at locations which will eliminate or minimize erosion during construction, as indicated.

B. BMPs temporary sedimentation controls: Consist of contour grading, silt dams, traps, barriers, sedimentation basins and other appurtenances.

PART 2 – PRODUCTS

2.1 EROSION CONTROL

A. Seed: Comply with Florida Department of Agriculture, and provide seed not less than 98% pure and free from noxious weed seeds. Provide tested seed acceptable to Owner before being sown. Seed, at

time of sowing - From previous or current year's harvest. Seed which has become wet, moldy, or otherwise damaged will not be acceptable.

B. Provide Hulled Common Bermuda (cynodon dactylon) having germination rate not less than 85%

C. Mulch for Seeded Areas: Clean, seed-free hay or threshed straw.

D. Matting: Mesh matting, fabricated of unbleached, undyed and loose-twist jute yarn.

E. Matting Stakes: Fir, Southern Pine or Hemlock, not smaller than 1/2 inch square.

F. Hydromulch: Mulch and tackifier.

2.2 SEDIMENTATION CONTROL

A. Bales: Clean, seed-free cereal hay or grainstraw.

B. Matting: Mesh matting, fabricated of unbleached, undyed and loose-twist jute yarn.

C. Matting Stakes: Fir, Southern Pine or Hemlock, not smaller than 1/2 inch square.

D. Filter Stone: Crushed gravel stone graded such that 100% of material will pass one inch sieve and not more than five percent will pass 1/4 inch sieve.

E. Concrete Block: Hollow, loadbearing type, as specified in Section 04 22 00 – Concrete Unit Masonry.

F. Concrete: Class 2500, as specified in Section 03 05 15 – Portland Cement Concrete.

G. Plywood: One inch thick, exterior type, as specified in Section 06 10 00 – Rough Carpentry.

H. Silt Barriers: Floating or staked.

PART 3 – EXECUTION

3.1 EROSION CONTROL

A. Sow seed with mechanical seed drills or rotary hand seeders within 24 hours after ground has been scarified. If seeds have been sown with rotary hand seeders, lightly rake seeded areas. Roll and sprinkle seeded areas before spreading mulch. Sow seed at rate of 100 pounds per acre.

B. On slopes flatter than 3:1 spread mulch to loose thickness of 3/4 inch to 1 1/2 inches. Immediately after spreading, press mulch into soil with a disc harrow set straight.

C. Spread matting over mulched areas on slopes steeper than 3:1 horizontal to vertical.

D. Roll seeded areas parallel to contours, and water in a manner which will encourage sprouting. Rework areas exhibiting unsatisfactory growth. Reseed in conformance with seeding requirements specified above. Fill, compact and reseed eroded areas.

3.2 SEDIMENTATION CONTROL

A. Maintain silt dams, traps and barriers until no longer needed, subject to acceptance of Owner or its designee, and then remove controls. Remove hay bales which have deteriorated and filter stone which has become dislodged. Place new hay bales and new filter stone. Maintain retention ponds in condition to retain unfiltered water. Dispose of silt removed from ponds within Worksite where practical.

3.3 REMOVAL

A. Remove controls upon completion of portion of Contract for which controls were furnished.

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Manufacturer's standard warranties and special warranties.

B. General product requirements.

C. Transportation, handling, storage and protection.

D. Product option requirements.

E. Substitution limitations and procedures.

F. Procedures for Owner-furnished products.

G. Maintenance materials, including extra materials, spare parts, tools, and software.

1.2 RELATED REQUIREMENTS

A. Document 00 21 13 - Instructions to Bidders: Product options and substitution procedures prior to bid date.

B. Section 01 40 00 - Quality Requirements: Product quality monitoring.

C. Section 01 74 19 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting packaging and substitutions.

1.3 REFERENCE STANDARDS

A. 16 CFR 260 - Guides for the Use of Environmental Marketing Claims; Federal Trade Commission; current edition.

B. CAN/CSA Z809 - National Standard for Sustainable Forest Management; CSA International Inc.; 2002 (R2007).

C. GreenSeal GS-36 - Commercial Adhesives; Green Seal, Inc.; 2000.

D. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

E. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.

1.4 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Agreement.
   2. For products specified only by reference standards, list applicable reference standards.

B. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
   1. Limit each request to one proposed substitution.
   2. Submit a separate form for each item upon which approval is requested, with the exception of groups of items (e.g., electrical fixtures, plumbing fixtures, etc.) for which an itemized listing may be attached.
   3. Substitutions shall be subject to approval of Architect and Owner. Contractor's reliance on substituted materials in developing its pricing shall not be construed as to create a requirement for approval.

C. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

D. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

E. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

1.5 QUALITY ASSURANCE

A. For products or workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
   1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

D. Should specified reference standards conflict with Contract Documents, request clarification from the Architect before proceeding.

E. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Architect shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
   1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
   2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
   1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
   2. Refer to Divisions 02 through 33. Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01 77 00 - Closeout Procedures. Section 01 60 00 Product Requirements

PART 2 - PRODUCTS

2.1 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by the Contract Documents.
   1. Means new material, machinery, components, equipment, fixtures, and systems comprising the Work. Does not include machinery and equipment used for preparation, fabrication, conveying, and erection of the Work.
   2. Products may also include existing materials or components when specifically designated for reuse.

B. Do not use products having any of the following characteristics:
   1. Made using or containing CFC's or HCFC's. 2. Made of wood from newly cut old growth timber.

C. Where all other criteria are met, Contractor shall give preference to products that:
   1. Are extracted, harvested, and/or manufactured closer to the location of the project.
   2. Have longer documented life span under normal use.
   3. Result in less construction waste.
   4. Are made of vegetable materials that are rapidly renewable.

D. Sustainably Harvested Wood:
   1. Definition: Wood-based materials include but are not limited to structural framing, dimension lumber, flooring, wood doors, finishes, and furnishings that are permanently installed in the project. Wood and wood-based products not permanently installed in the project are not included in the definition.
   2. Specific Wood-Based Fabrications: Fabricate of sustainably harvested wood when so specified elsewhere.
   3. Certification: Provide wood certified or labeled by an organization accredited by one of the following:
      a. The Forest Stewardship Council, The Principles for Natural Forest Management; for the United States visit http://www.fscus.org.

2.2 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
   1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
   2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
   3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
   4. Where products are accompanied by the term "as selected," Architect will make selection.
   5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

2.3 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming Products of More than One Manufacturer: Use one of the products named and meeting specifications, no options or substitutions allowed.

D. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

E. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Submit a request for substitution for other named manufacturers. Use of manufacturers not named not allowed.

F. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
   1. If no product available within specified category matches and complies with other specified requirements, comply with requirements for substitutions

G. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.4 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 - EXECUTION

3.1 SUBSTITUTION PROCEDURES

A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section. Requests receive after that time will not be considered except as specified below under "Substitutions Requested After Award of Contract."

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.

C. A request for substitution constitutes a representation that the Contractor/Bidder:
1. Has investigated proposed product and determined that it is equal to or superior in all respects to specified product.
2. Will provide identical warranty as required for the specified product.
3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
4. Waives claims for additional costs or time extension that may subsequently become apparent.
5. Will pay for changes to building design, including architectural or engineering design, detailing, construction costs, or re-approval by authorities caused by the requested substitution.

D. Substitutions after Award of Contract will not be considered when:
1. Indicated or implied on shop drawings or product data submittals without formal request submitted in accordance with this Section.
2. Submittal for substitution request has not been reviewed and recommended by Contractor. Substitution requests received directly from Subcontractors or Suppliers will be returned through the Contractor without review.
3. Acceptance will require substantial revision of Contract Documents or other items of the Work.
4. Submittal for substitution request does not include point-by-point comparison of proposed substitution with specified product.

E. Substitution Request Form:
1. Use Substitution Request Form for substitution requests during the bid phase.
2. Use "Substitution Request (After the Bidding Phase)" form bound at the end of this Section for substitution requests after the Award of Contract.
3. Requests related to Mechanical and/or Electrical Work may be submitted directly to each respective Consulting Engineer, with duplicate copies to the Architect and Owner.
   a. Action on request will be returned through the Architect.

F. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
1. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
2. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
3. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
4. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
5. Samples, where applicable or requested.
6. Certificates and qualification data, where applicable or requested.
7. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
8. List of availability of maintenance services and replacement materials.

9. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
10. Research reports evidencing compliance with building code in effect for Project, from ICCES.
11. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
12. Cost information, including a proposal of change, if any, in the Contract Sum.
13. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
14. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

G. Accepted Substitutions prior to Bid Date will be listed in Addenda published in accordance with Advertisement for Bids and the Instructions to Bidders. Bidders will not rely upon approvals made in any other manner.

H. Architect's Action for Substitutions After Award of Contract: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
1. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
2. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

3.2 SUBSTITUTIONS REQUESTED AFTER AWARD OF CONTRACT

A. Substitutions will normally not be considered after date listed in Instructions to Bidders, except when required due to unforeseen circumstances. Within a period of 30 days after date of Contract, the Owner may, at its option, consider formal written requests for substitution of products in place of those specified when submitted in accord with the requirements stipulated herein. To receive consideration, one or more of the following conditions must be documented in any such request:
1. The substitution is required for compliance with final interpretation of Code requirements or insurance regulations.
2. The substitution is required due to unavailability of a specified product, through no fault of the Contractor.
3. The substitution is required because subsequent information disclosed the inability of the specified product to perform properly or to fit in the designated space.
4. Requested substitution offers Owner a substantial advantage in cost, time, performance, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.

3.3 TRANSPORTATION AND HANDLING

A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

B. 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.

C. Transport and handle products in accordance with manufacturer's instructions.

D. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

E. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

F. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

G. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.4 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store materials in a manner that will not endanger Project structure.

C. Store and protect products in accordance with manufacturers' instructions.

D. Store with seals and labels intact and legible.

E. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

F. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

G. For exterior storage of fabricated products, place on sloped supports above ground.

H. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.

I. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

J. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

K. Prevent contact with material that may cause corrosion, discoloration, or staining.

L. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

M. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 65 00

PRODUCT DELIVERY REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:
1. This Section includes the general requirements for preparing for shipping, delivering, and handling materials and equipment.
2. Contractor shall make all arrangements for transporting, delivering, and handling of materials and equipment required for prosecution and completion of the Work.
3. When required, move stored materials and equipment without additional compensation and without changes to the Contract Times.

1.2 SUBMITTALS

A. Refer to individual Specification Sections for submittal requirements relative to delivering and handling materials and equipment.

1.3 PREPARING FOR SHIPMENT

A. When practical, factory-assemble materials and equipment. Match mark or tag separate parts and assemblies to facilitate field assembly. Cover machined and unpainted parts that may be damaged by the elements with strippable, protective coating.

B. Package materials and equipment to facilitate handling, and protect materials and equipment from damage during shipping, handling, and storage. Mark or tag outside of each package or crate to indicate the associated purchase order number, bill of lading number, contents by name, Owner's contract name and number, Contractor name, equipment number, and approximate weight. Include complete packing lists and bills of materials with each shipment.

C. Protect materials and equipment from exposure to the elements and keep thoroughly dry and dust-free at all times. Protect painted surfaces against impact, abrasion, discoloration, and other damage. Lubricate bearings and other items requiring lubrication in accordance with manufacturer's instructions.

D. Advance Notice of Shipments:
1. Keep Architect informed of delivery of all materials and equipment to be incorporated in the Work.

E. Do not ship materials and equipment until:
1. Related Shop Drawings, Samples, and other submittals have been approved or accepted (as applicable) by Architect, including, but not necessarily limited to, all Action Submittals associated with the materials and equipment being delivered.
2. Manufacturer's instructions for handling, storing, and installing the associated materials and equipment have been submitted to and accepted by Architect in accordance with the Specifications.
3. Results of source quality control testing (factory testing), when required by the Contract Documents for the associated materials or equipment, have been reviewed and accepted by Architect.
4. Facilities required for handling materials and equipment in accordance with manufacturer's instructions are in place and available.
5. Required storage facilities have been provided.

1.4 DELIVERY

A. Scheduling and Timing of Deliveries:
1. Arrange deliveries of materials and equipment in accordance with the accepted Progress Schedule and in ample time to facilitate inspection prior to installation.
2. Schedule deliveries to minimize space required for and duration of storage of materials and equipment at the Site or delivery location, as applicable.
3. Coordinate deliveries to avoid conflicting with the Work and conditions at Site, and to accommodate the following:

a. Work of subcontractors and Owner.
b. Storage space limitations.
c. Availability of equipment and personnel for handling materials and equipment.
d. Owner's use of premises.

4. Deliver materials and equipment to the Site during regular working hours.
5. Deliver materials and equipment to avoid delaying the Work and the Project, including work of other contractors, as applicable. Deliver anchor system materials, including anchor bolts to be embedded in concrete or masonry, in ample time to avoid delaying the Work.

B. Deliveries:

1. Shipments shall be delivered with Contractor's name, Subcontractor's name (if applicable), Site name, Project name, and contract designation (example: "ABC Construction Co., City of Somewhere, Idaho, Wastewater Treatment Plant Primary Clarifier Improvements, Contract 25, General Construction") clearly marked.
2. Site may be listed as the "ship to" or "delivery" address; but Owner shall not be listed as recipient of shipment unless otherwise directed in writing by Architect.
3. Provide Contractor's telephone number to shipper; do not provide Owner's telephone number.
4. Arrange for deliveries while CONTRACTOR's personnel are at the Site. Contractor shall receive and coordinate shipments upon delivery. Shipments delivered to the Site when Contractor is not present will be refused by Owner and/or Architect, and Contractor shall be responsible for the associated delays and additional costs, if incurred.

C. Containers and Marking:

1. Have materials and equipment delivered in manufacturer's original, unopened, labeled containers.
2. Clearly mark partial deliveries of component parts of materials and equipment to identify materials and equipment, to allow easy accumulation of parts, and to facilitate assembly.

D. Inspection of Deliveries:

1. Immediately upon delivery, inspect shipment to verify that:
   a. Materials and equipment comply with the Contract Documents and approved or accepted (as applicable) submittals.
   b. Quantities are correct.
   c. Materials and equipment are undamaged.
   d. Containers and packages are intact and labels are legible.
   e. Materials and equipment are properly protected.
2. Promptly remove damaged materials and equipment from the Site and expedite delivery of new, undamaged materials and equipment, and remedy incomplete or lost materials and equipment to furnish materials and equipment in accordance with the Contract Documents, to avoid delaying progress of the Work.
3. Advise Architect in writing when damaged, incomplete, or defective materials and equipment are delivered, and advise Architect of the associated impact on the Progress Schedule.

1.5 HANDLING OF MATERIALS AND EQUIPMENT

A. Provide equipment and personnel necessary to handle materials and equipment, including those furnished by Owner, by methods that prevent soiling or damaging materials and equipment and packaging.

B. Provide additional protection during handling as necessary to prevent scraping, marring, and otherwise damaging materials and equipment and surrounding surfaces.

C. Handle materials and equipment by methods that prevent bending and overstressing.

D. Lift heavy components only at designated lifting points.

E. Handle materials and equipment in safe manner and as recommended by the manufacturer to prevent damage. Do not drop, roll, or skid materials and equipment off delivery vehicles or at other times during handling. Hand-carry or use suitable handling equipment.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 66 00

PRODUCT STORAGE AND HANDLING REQUIREMENTS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Providing storage and protection of equipment, materials, products and supplies to be incorporated into construction; indicating such storage areas on Working Drawings, product packaging and handling; product transportation and delivery; and product Material Safety Data Sheets (MSDS).

1.2 RELATED SECTIONS

A. Section 01 33 00: Submittal Procedures

B. Section 01 78 23: Operation and Maintenance Data

1.3 REFERENCES

A. South Coast Air Quality Management District (SCAQMD):
1. Rule 102 – Definition of Terms
2. Rule 1113 – Architectural Coatings
3. Rule 1168 – Adhesive and Sealant Applications

B. Environmental Protection Agency (EPA) – for applicable regulations.

1.4 QUALITY ASSURANCE

A. Comply with Project Quality Program Requirements (see 1.2 above).

B. Materials, equipment, appliances, fixtures, and fabricated assemblies to be incorporated in the Work shall be new, except as may be indicated or specified otherwise in the Contract Documents.

C. Materials, equipment, assemblies, and systems shall be manufactured, fabricated, handled, and incorporated into the Work so as to ensure completed Work meeting the Contract requirements.

1.5 SUBMITTALS

A. Refer to Section 01 33 00 – Submittals, for submittal requirements and procedures.

B. Working Drawings: Show locations of storage areas not indicated on Contract Drawings. Do not locate storage areas in dedicated streets, within drip line of shrubs and trees indicated to remain, in pedestrian ways, or on private property without approval of property owner

C. Procedures to evaluate and implement storage and handling requirements and ensure that materials are stored accordingly.

D. Material Safety Data Sheets (MSDS): Manufacturer's Material Safety Data Sheets for each material used in Work.

1.6 DEFINITIONS

A. VOC: Volatile Organic Compound, as defined in SCAQMD Rule 102 – Definition of Terms:
1. Any volatile compound of carbon, excluding methane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, ammonium carbonate, and exempt compounds.

B. SCAQMD: South Coast Air Quality Management District

PART 2 - PRODUCTS

2.1 MATERIALS

A. Materials required for storage and protection of items specified: Durable, weatherproof, and painted to present appearance acceptable to Metro or its designee.

PART 3 – EXECUTION

3.1 PACKAGING AND HANDLING

A. Protect items during transport and handling.
   1. Include lifting or handling provisions to facilitate Worksite unloading and handling.

B. Protect projecting parts from damage and preclude personnel safety hazards.

C. Provide Packaging to protect against adverse environmental conditions.

D. Small parts shall be packaged in containers such as boxes, crates, or barrels to avoid dispersal and loss.
   1. Firmly secure an itemized list and description of contents to each such container.

3.2 TRANSPORTATION AND DELIVERY

A. Deliver materials in undamaged condition, in manufacturer's original containers or packaging (where applicable), with identifying labels intact and legible.

B. Deliver cement, prepared dry mortar mixes, grouting material, plaster, and coloring material in original, unopened and sealed containers, bearing the brand and manufacturer's name.

C. Refer also to the individual Specifications Sections for detailed requirements as applicable.

D. Perform receiving inspection of materials to ensure correct quantities, proper documentation and undamaged condition.

3.3 STORAGE

A. Confine operations, including storage of materials, to areas authorized or accepted by Owner or its designee.

B. Temporary buildings such as storage sheds, shops and offices, may be erected by Contractor only with approval of Owner or its designee; construct with labor and materials furnished by Contractor without additional expense to Owner.
   1. Temporary buildings and utilities will remain property of Contractor; and must be removed upon completion of Work.

C. Palletize materials, products and supplies to be incorporated into construction; store off the ground, in areas indicated as storage areas on Contract Drawings and on accepted Working Drawings.

D. Store items in manner to prevent damage and facilitate inspection. Leave seals, tags and labels intact and legible. Maintain access to products to allow inspection. Protect products which would be affected by adverse environmental conditions.

E. Store items in manner to prevent damage to Owner's property.

F. Replace materials damaged or lost during storage with acceptable materials. Damaged materials may be repaired for use in this Contract only when specifically allowed by Owner or its designee.

G. Do not stack lumber higher than eight feet in unsecured areas. Conform to OSHA requirements. Periodically inspect stored products to ensure products are stored as specified and are free from damage and deterioration. Do not remove items from storage until they are to be incorporated into Work.

H. Do not stack materials for incorporation into Work or for methods and means of construction higher than five feet when using city streets, sidewalks or decking as temporary storage area.
   1. Keep access to fire alarms and hydrants clear. Do not temporarily store materials within 15 feet of fire alarm and hydrant facilities.

I. Store Owner Furnished Equipment in the same manner as Contractor supplied equipment.

J. Implement provisions for installed storage of equipment as required, such as rotating motors, humidity control in cabinets, and like items.

K. Follow manufacturer's instructions for material storage to the extent it is practical.

L. Preserve tags, labels, shipping documents, and like items, that are necessary to maintain traceability of the materials.

M. Establish a controlled distribution process to release materials for construction and maintain an accurate inventory.

3.4 MATERIAL SAFETY DATA SHEETS (MSDS)

A. Furnish MSDS for materials to be incorporated in Work.
   1. Provide one or more file drawers in Contractor's field office (or other acceptable location) for filing of MSDS.
   2. File MSDS in accordance with Specification Section numbers, and make readily available to Owner or its designee; jurisdictional inspection authorities; and personnel engaged in Work.

B. Post MSDS for material that are flammable or otherwise hazardous on bulletin board provided for this specific purpose.
   1. Locate bulletin board at Worksite, sheltered from rain and wind and readily accessible to personnel engaged in Work.

END OF SECTION

SECTION 01 70 00

PROJECT CLOSEOUT

PART 1 – GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

A. Provisions of this section apply to the procedural requirements for the actual closeout of the Work, not to administrative matters such as final payment or the changeover of insurance. Closeout requirements relate to both substantial and final completion of the Work; they also apply to individual portions of completed work as well as the total Work. Specific requirements contained in other sections have precedence over the general requirements contained in this section.

1.2 PROCEDURES

A. Substantial Completion:
1. Prerequisites: Comply with the General Conditions and complete the following before requesting the Architect's inspection of the Work, or a designated portion of the Work, for certification of substantial completion.
   a. Submit executed warranties, workmanship bonds, maintenance agreements, inspection certificates and similar required documentation for specific units of work enabling Owner's unrestricted occupancy and use.
   b. Submit record documentation, maintenance manuals, tools, spare parts, keys and similar operational items.
   c. Complete instruction of Owner's operating personnel, and start-up of systems.
   d. Complete final cleaning, and remove temporary facilities and tools.

B. Inspection Procedures: Upon receipt of Contractor's request Architect will either proceed with inspection or advise Contractor of prerequisites not fulfilled. Following initial inspection, Architect will either prepare certificate of substantial completion, or advise Contractor of work that must be performed prior to issuance of the certificate of substantial completed. Results of the completed inspection will form the initial "punch-list" for final acceptance.

C. Procedures at Final Acceptance:
1. Re-inspection Procedure: The Architect will re-inspect the Work upon receipt of the Contractor's notice that, except for these items whose completion has been delayed due to circumstances that are acceptable to the Architect, the Work has been completed, including punch-list items from earlier inspections.
2. Upon completion of re-inspection, the Architect will advise the contractor of work not completed or obligations not fulfilled as required for final acceptance. If necessary, this procedure will be repeated.

1.3 Record Documentation:

A. Record Drawings: Maintain a complete set of either blue- or black-line prints of the contract drawings and shop drawings for record mark-up purposes throughout the Contract Time. Mark- up these drawings during the course of the work to show both changes and the actual installation, in sufficient detail to form a complete record for the Owner's purposes. Give particular attention to work that will be concealed and difficult to measure and record at a later date, and work that may require servicing or replacement during the life of the project. Transfer the mark-ups to a clean set of blackline prints or digital copy. See Section 01 78 39, Record Project Record Documents. Require the entities marking prints to sign and date each mark-up.

1.4 GENERAL CLOSEOUT REQUIREMENTS

A. Operator Instructions: Require each Installer of systems requiring continued operation and maintenance by Owner's operating personnel, to provide on-location instruction to Owner's personnel, sufficient to ensure safe, secure, efficient, non-failing utilization and operation of systems.

1.5 FINAL CLEANING

A. At the time of project closeout, clean or re-clean the work to the condition expected from a normal, commercial building cleaning and maintenance program. Complete the following cleaning operations before requesting the Architect/Engineer's inspection for certification of substantial completions

1. Remove non-permanent protection and labels
2. Clean exposed finishes, including windows, interior and exterior
3. Touch-up minor finish damage
4. Remove debris
5. Broom-clean and vacuum area
6. Sweep and wash paved areas
7. Police yards, grounds

END OF SECTION

SECTION 01 71 23

FIELD ENGINEERING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Quality Assurance
2. Submittals
3. Project Record Documents
4. Survey Requirements
5. Examination
6. Survey Reference Points

B. Related Sections:
1. Section 01 49 00 - Geotechnical Data: Owner's topographic survey.
2. Section 01 77 00 – Closeout Procedures

1.2 QUALITY ASSURANCE

A. Employ a Land Surveyor or Engineer registered in the State of Florida and acceptable to the Owner, to perform survey work of this section.

B. Submit evidence of Surveyor's or Engineer’s Errors and Omissions insurance coverage in the form of an Insurance Certificate.

1.3 SUBMITTALS

A. Submit a copy of registered site drawing and a certificate signed by the Land Surveyor or Engineer, that the elevations and locations of the Work are in conformance with Contract Documents.

B. On request, submit documentation verifying accuracy of survey work.

1.4 PROJECT RECORD DOCUMENTS

A. Maintain a complete and accurate log of control and survey work as it progresses.

B. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

1.5 SURVEY REQUIREMENTS

A. Provide all survey work required for horizontal and vertical location of all work in this Project. Utilize recognized engineering survey practices.

B. Establish a minimum of two permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on project record documents.

C. Submit Project Record Documents under provisions of Section 01 78 39.

D. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means.

E. Periodically verify layouts by same means

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify locations of survey control points prior to starting work. Verify set-backs and easements, confirm drawing dimensions and elevations. B. Promptly notify Owner's Representative of any discrepancies discovered.

3.2 SURVEY REFERENCE POINTS

A. Contractor to locate and protect survey control and reference points.

B. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

C. Promptly report to Owner's Representative the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

D. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Owner's Representative.

END OF SECTION

SECTION 01 73 00

EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
1. Construction layout.
2. Installation of the Work.
3. Cutting and patching.
4. Coordination of Owner-installed products.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.
8. Correction of the Work.

B. Related Sections:
1. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
2. Division 07 Section "Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of utilities and construction indicated as existing are not guaranteed. Before beginning any work, investigate and verify the existence and location of existing mechanical and electrical systems, and other construction affecting the Work.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Coordinate with authorities having jurisdiction.

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 caused by differing field conditions outside the control of the Contractor, submit a request for information to Architect/Engineer according to requirements in Division 01 Section "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect/Engineer promptly.

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90” in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Pre-installation Conferences: Include Owner's construction personnel at pre-installation conferences covering portions of the Work that are to receive Owner's work. Attend pre-installation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80°F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations. a. Utilize containers intended for holding waste materials of type to be stored.
4. Coordinate progress cleaning for joint-use areas where more than one installer has worked.

B. Site: Maintain Project site free of waste materials and debris.

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 in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."

H. 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 at Substantial Completion.

I. 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.

J. 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.

3.7 STARTING AND ADJUSTING

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

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

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: Comply with qualification requirements in Division 01 Section "Quality Requirements."

3.8 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.

3.9 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.
   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 specified 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.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of contract including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.

1.2 SUMMARY

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

B. Related Sections:
1. Refer to other sections for specific requirements and limitations applicable to cutting and patching individual parts of the work.
2. Requirements of this Section apply to mechanical and electrical installations. Refer to Mechanical and Electrical Sections of Project Manual for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 QUALITY ASSURANCE

A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.

B. Operational Limitations: Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased or decreased operational life or safety.

C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually unsatisfactory manner.

1.4 WARRANTY

A. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

PART 2 – PRODUCTS

2.1 MATERIALS, GENERAL

A. Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible if identical materials are unavailable or cannot be used. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 – EXECUTION

3.1 INSPECTION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action before proceeding.
1. Before proceeding, meet at the Project Site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate all procedures and resolve all potential conflicts before proceeding.

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 the Project that might be exposed during cutting and patching operations.

C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Avoid cutting existing pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated until provisions have been made to bypass them.

3.3 PERFORMANCE

A. General: Employ skilled workmen 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 activities and the subsequent fitting and patching required to restore surfaces to their original condition.

B. Cutting: Cut existing construction using methods least likely to damage elements retained or adjoining construction. Where possible, review proposed procedures with the original Installer; comply with original Installer's recommendations.
   1. In general, where cutting, use hand or small power tools designed for sawing or 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. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
   3. Cut through concrete and masonry using a cutting machine, such as a carborundum saw or a diamond-core drill.
   4. Comply with requirements of applicable Division 2 sections where cutting and patching requires excavating and backfilling.
   5. Where services are required to be removed, relocated, or abandoned, by-pass utility services, such as pipe or conduit, before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.
   6. Coordinate with Owner's roofing Consultant prior to making any penetrations of the membrane roof.

C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
   1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
   2. 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. Where removing walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform color 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 smooth painted surface, extend final paint coat over entire unbroken surface containing the patch after the area received primer and second coat.
   4. Patch, repair, or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
   5. Coordinate with the Owner's roofing Consultant on the proper method and procedure of flashing and repairing penetrations on the membrane roof for the installation of the scheduled mechanical equipment.
   6. Patch and seal all space around ducts, conduits, and piping penetrations to exterior walls. This requirement applies to both new and existing conditions

3.4 CLEANING

A. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

END OF SECTION

SECTION 01 74 13

PROGRESS CLEANING

PART 1 – GENERAL

1.1 REQUIREMENTS INCLUDE

A. Contractor shall provide all progress cleaning including for the Work of assigned sub-contractors.
   1. During the progress of the Work, the Contractor shall store materials and equipment in an orderly manner and shall at all times keep the premises free from debris, litter, rubbish, and obstruction.

1.2 SAFETY REQUIREMENTS

A. Comply with the requirements of Authorities having jurisdiction.

PART 2 – PRODUCTS

2.1 CLEANING MATERIALS

A. 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.

B. Cleaning agents shall meet Green Globes Standards

C. Floor cleaners shall comply with maximum allowable VOC content.

D. Disposable paper products, supplies, and trash bags shall meet the minimum requirements of the US Environmental Protection Agency's Comprehensive Procurement Guidelines.

PART 3 – EXECUTION

3.1 PROGRESS CLEANING

A. Provide progress cleaning. Do not conflict with related Project Sections. Resolve any conflicts that arise with Architect.

B. Contractor shall keep the building and premises free from all surplus material, waste material, dirt and rubbish caused by his employees or work, and at the completion of his work shall remove all such surplus material, waste material, dirt and rubbish, as well as his tolls, equipment and scaffolding, and shall leave his work clean and spotless, unless more exact requirements are specified. In case of dispute, the Owner may remove all such items and charge the cost of such removal to the Contractor.

C. Each sub-contractor shall perform his clean-up daily and shall transport his rubbish to an on-site location designated by the Contractor, who will arrange for its removal.

D. At no time shall the Owner's waste containers be used. Requests for dumpster usage and placement must be verified with the Owner. 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.

E. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations

F. Employ experienced workers or professional cleaners for progress cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

END OF SECTION

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT

PART 1 – GENERAL

1.1 DESCRIPTION

A. This section specifies the requirements for the management of non-hazardous building construction and demolition waste.

B. Waste disposal in landfills shall be minimized to the greatest extent possible. Of the inevitable waste that is generated, as much of the waste material as economically feasible shall be salvaged, recycled or reused.

C. Contractor shall use all reasonable means to divert construction and demolition waste from landfills and incinerators, and facilitate their salvage and recycle not limited to the following:
1. Waste Management Plan development and implementation.
2. Techniques to minimize waste generation.
3. Sorting and separating of waste materials.
4. Salvage of existing materials and items for reuse or resale.
5. Recycling of materials that cannot be reused or sold.

D. At a minimum the following waste categories shall be diverted from landfills:
1. Soil.
2. Inerts (eg, concrete, masonry and asphalt).
3. Clean dimensional wood and palette wood.
4. Green waste (biodegradable landscaping materials).
5. Engineered wood products (plywood, particle board and I-joists, etc).
6. Metal products (eg, steel, wire, beverage containers, copper, etc).
7. Cardboard, paper and packaging.
8. Bitumen roofing materials.
9. Plastics (eg, ABS, PVC).
10. Carpet and/or pad.
11. Gypsum board.
12. Insulation.
13. Paint.
14. Fluorescent lamps.

1.2 RELATED WORK

A. Section 02 41 00, DEMOLITION.

B. Division 1, General Requirements

1.3 QUALITY ASSURANCE

A. Contractor shall practice efficient waste management when sizing, cutting and installing building products. Processes shall be employed to ensure the generation of as little waste as possible. Construction /Demolition waste includes products of the following:
1. Excess or unusable construction materials.
2. Packaging used for construction products.
3. Poor planning and/or layout.
4. Construction error.
5. Over ordering.
6. Weather damage.
7. Contamination.
8. Mishandling.
9. Breakage.

B. Establish and maintain the management of non-hazardous building construction and demolition waste set forth herein. Conduct a site assessment to estimate the types of materials that will be generated by demolition and construction.

C. Contractor shall develop and implement procedures to recycle construction and demolition waste to a minimum of 50%.

D. Contractor shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling. Any revenues or savings obtained from salvage or recycling shall accrue to the contractor.

E. Contractor shall provide all demolition, removal and legal disposal of materials. Contractor shall ensure that facilities used for recycling, reuse and disposal shall be permitted for the intended use to the extent required by local, state, federal regulations. The Whole Building Design Guide website http://www.wbdg.org/tools/cwm.php provides a Construction Waste Management Database that contains information on companies that haul, collect, and process recyclable debris from construction projects.

F. Contractor shall assign a specific area to facilitate separation of materials for reuse, salvage, recycling, and return. Such areas are to be kept neat and clean and clearly marked in order to avoid contamination or mixing of materials.

G. Contractor shall provide on-site instructions and supervision of separation, handling, salvaging, recycling, reuse and return methods to be used by all parties during waste generating stages.

H. Record on daily reports any problems in complying with laws, regulations and ordinances with corrective action taken.

1.4 TERMINOLOGY

A. Class III Landfill: A landfill that accepts non-hazardous resources such as household, commercial and industrial waste resulting from construction, remodeling, repair and demolition operations.

B. Clean: Untreated and unpainted; uncontaminated with adhesives, oils, solvents, mastics and like products.

C. Construction and Demolition Waste: Includes all non-hazardous resources resulting from construction, remodeling, alterations, repair and demolition operations.

D. Dismantle: The process of parting out a building in such a way as to preserve the usefulness of its materials and components.

E. Disposal: Acceptance of solid wastes at a legally operating facility for the purpose of land filling (includes Class III landfills and inert fills).

F. Inert Backfill Site: A location, other than inert fill or other disposal facility, to which inert materials are taken for the purpose of filling an excavation, shoring or other soil engineering operation.

G. Inert Fill: A facility that can legally accept inert waste, such as asphalt and concrete exclusively for the purpose of disposal.

H. Inert Solids/Inert Waste: Non-liquid solid resources including, but not limited to, soil and concrete that does not contain hazardous waste or soluble pollutants at concentrations in excess of water-quality objectives established by a regional water board, and does not contain significant quantities of decomposable solid resources.

I. Mixed Debris: Loads that include commingled recyclable and non-recyclable materials generated at the construction site.

J. Mixed Debris Recycling Facility: A solid resource processing facility that accepts loads of mixed construction and demolition debris for the purpose of recovering re-usable and recyclable materials and disposing non-recyclable materials.

K. Permitted Waste Hauler: A company that holds a valid permit to collect and transport solid wastes from individuals or businesses for the purpose of recycling or disposal.

L. Recycling: The process of sorting, cleansing, treating, and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating or thermally destroying solid waste.

1. On-site Recycling – Materials that are sorted and processed on site for use in an altered state in the work, i.e. concrete crushed for use as a sub-base in paving.
2. Off-site Recycling – Materials hauled to a location and used in an altered form in the manufacture of new products.

M. Recycling Facility: An operation that can legally accept materials for the purpose of processing the materials into an altered form for the manufacture of new products. Depending on the types of materials accepted and operating procedures, a recycling facility may or may not be required to have a solid waste facilities permit or be regulated by the local enforcement agency.

N. Reuse: Materials that are recovered for use in the same form, on-site or off-site.

O. Return: To give back reusable items or unused products to vendors for credit.

P. Salvage: To remove waste materials from the site for resale or re-use by a third party.

Q. Source-Separated Materials: Materials that are sorted by type at the site for the purpose of reuse and recycling.

R. Solid Waste: Materials that have been designated as non-recyclable and are discarded for the purposes of disposal.

S. Transfer Station: A facility that can legally accept solid waste for the purpose of temporarily storing the materials for re-loading onto other trucks and transporting them to a landfill for disposal, or recovering some materials for re-use or recycling.

1.5 SUBMITTALS

A. In accordance with Section 01 33 00, Submittals

B. Prepare and submit to the Resident Engineer a written demolition debris management plan. The plan shall include, but not be limited to, the following information:
1. Procedures to be used for debris management.
2. Techniques to be used to minimize waste generation.
3. Analysis of the estimated job site waste to be generated:
   a. List of each material and quantity to be salvaged, reused, recycled.
   b. List of each material and quantity proposed to be taken to a landfill.
4. Detailed description of the Means/Methods to be used for material handling.
   a. On site: Material separation, storage, protection where applicable.
   b. Off site: Transportation means and destination. Include list of materials.
      1) Description of materials to be site-separated and self-hauled to designated facilities.
      2) Description of mixed materials to be collected by designated waste haulers and removed from the site.
   c. The names and locations of mixed debris reuse and recycling facilities or sites.
   d. The names and locations of trash disposal landfill facilities or sites.
   e. Documentation that the facilities or sites are approved to receive the materials.

C. Designated Manager responsible for instructing personnel, supervising, documenting and administer over meetings relevant to the Waste Management Plan.

D. Monthly summary of construction and demolition debris diversion and disposal, quantifying all materials generated at the work site and disposed of or diverted from disposal through recycling.

1.6 APPLICABLE PUBLICATIONS

A Publications listed below form a part of this specification to the extent referenced. Publications are referenced by the basic designation only. In the event that criteria requirements conflict, the most stringent requirements shall be met.

B. U.S. Green Building Council (USGBC):
LEED Green Building Rating System for New Construction

1.7 RECORDS

A. Maintain records to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. Records shall be kept in accordance with the LEED Reference Guide and LEED Template.

PART 2 - PRODUCTS

2.1 MATERIALS

A. List of each material and quantity to be salvaged, recycled, reused.

B. List of each material and quantity proposed to be taken to a landfill.

C. Material tracking data: Receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices, net total costs or savings.

PART 3 - EXECUTION

3.1 COLLECTION

A. Provide all necessary containers, bins and storage areas to facilitate effective waste management.

B. Clearly identify containers, bins and storage areas so that recyclable materials are separated from trash and can be transported to respective recycling facility for processing.

C. Hazardous wastes shall be separated, stored, disposed of according to local, state, federal regulations.

3.2 DISPOSAL

A. Contractor shall be responsible for transporting and disposing of materials that cannot be delivered to a source-separated or mixed materials recycling facility to a transfer station or disposal facility that can accept the materials in accordance with state and federal regulations.

B. Construction or demolition materials with no practical reuse or that cannot be salvaged or recycled shall be disposed of at a landfill or incinerator.

3.3 REPORT

A. With each application for progress payment, submit a summary of construction and demolition debris diversion and disposal including beginning and ending dates of period covered.

B. Quantify all materials diverted from landfill disposal through salvage or recycling during the period with the receiving parties, dates removed, transportation costs, weight tickets, manifests, invoices. Include the net total costs or savings for each salvaged or recycled material.

C. Quantify all materials disposed of during the period with the receiving parties, dates removed, transportation costs, weight tickets, tipping fees, manifests, invoices. Include the net total costs for each disposal.

END OF SECTION

SECTION 01 74 23

FINAL CLEANING

PART 1 – GENERAL

1.1 REQUIREMENTS INCLUDE

A. Contractor: Provide all final cleaning including for the Work of assigned Sub-contractors.
   1. At completion of work remove all waste, debris, rubbish, tools, equipment, machinery and surplus materials. Clean all sight exposed surfaces; leave work clean and ready for occupancy.

1.2 RELATED REQUIREMENTS

A. Specified Elsewhere
   1. 01 74 13 – Progress Cleaning

1.3 SAFETY REQUIREMENTS

A. Comply with the requirements of Authorities having jurisdiction

PART 2 – PRODUCTS

2.1 CLEANING 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.

B. Cleaning agents shall meet Green Seal GS-37 Standards.

C. Floor cleaners shall comply with the California Code of Regulations maximum allowable VOC content.

D. Disposable paper products, supplies and trash bags shall meet the minimum requirements of the US Environmental Protection Agency's Comprehensive Procurement Guidelines.

E. Use only products that comply with Green Globes Standards for maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Do not conflict with related Project Sections. Resolve with AE should any conflicts arise.

B. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

C. 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.

D. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
   1. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   2. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   3. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   4. Remove tools, construction equipment, machinery, and surplus material from Project site.
   5. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   6. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

7. Sweep concrete floors broom clean in unoccupied spaces.
8. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
9. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
10. Remove labels that are not permanent.
11. 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.
    a. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
12. Remove grease, dust, dirt, stains, labels, fingerprints, protection and other foreign materials from sight-exposed interior and exterior finished surfaces; polish surfaces so designated to specified finish.
    a. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces to ensure performance.
13. Contractor vacuum clean and mop all surfaces of pedestal floors and supports, including entire area beneath pedestal floors.
14. Ventilating Contractor replace air handling (conditioning) filters if units were operated during construction. Clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
15. Ventilating Contractor vacuum clean ducts, blowers and coils, when directed by AE.
16. Each contractor maintain finally cleaned areas until project, or designated portion thereof, is accepted by the Owner.
17. Wipe surfaces of mechanical and electrical equipment, elevator equipment,, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
18. Replace parts subject to unusual operating conditions.
19. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
20. First subparagraph below describes a major work item that may be disruptive to closeout procedures.
21. Clean ducts, blowers, and coils if units were operated without filters during construction.
22. 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.
23. Leave Project clean and ready for occupancy.

E. 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

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 other Division 0 and Division 1 Specification Sections, 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. Warranties
3. Final cleaning

B. Related Sections include the following:
1. Division 1 Section "Application and Certification for Payment"
2. Division 1 Section "Project Record Documents"
3. Division 1 Section "Operation and Maintenance Data"
4. Division 1 Section "Demonstration and Training"
5. Division 2-16 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases
5. Prepare and submit Project Record Documents, operation and maintenance manuals, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems
9. Submit test/adjust/balance records
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities
12. Submit changeover information related to Owner's occupancy, use, operation and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, 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. Contractor will be charged for Architect's, Consulting Engineer's, and Owner's time incurred to re-inspect incomplete work.
2. Results of completed inspection will form the basis of requirements to Final Completion

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 Section "Application and Certification for Payment"
   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.
   3. Submit evidence of final completion and continuing insurance coverage complying with insurance requirements.
   4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will approve preparation of the 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. Contractor will be charged for Architect's, Consulting Engineer's, and Owner's time incurred to re-inspect incomplete work.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification for each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
   1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
   2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
   3. Include the following information at the top of each page:
      a. Project name
      b. Date
      c. Name of Architect
      d. Name of Contractor
      e. Page Number

1.6 WARRANTIES

A. Submittal Time: Submit written warranties for designated portions of the Work where commencement of warranties other than the date of Substantial Completion is indicated.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by the Owner during construction indicated.

C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
   1. Bind warranties and bonds in heavy duty, 3 ring, vinyl covered, loose leaf binders, thickness as necessary to accommodate contents, and sized to receive 8 ½ x 11 inch paper.
   2. Provide heavy paper dividers with plastic covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address and telephone number of Installer.
   3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES", Project Name, and name of the Contractor.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

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, property, environment, or that may cause damage to finished surfaces.

PART 3 – EXECUTION

3.1 FINAL CLEANING

A. Provide final cleaning. Conduct cleaning and waste removal operations to comply with local laws and ordinances and Federal and local environmental and anti-pollution 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.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of the Project:
   a. Clean Project site, yard and grounds, in areas disturbed by construction activities, including landscape development areas. Clean these areas of all rubbish, waste material, litter and other foreign objects.
   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 materials from Project site.
   e. Clean exposed exterior and interior hard surface finishes to a dirt free condition. These areas shall be free of stains, films and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.
   g. Sweep concrete floors broom clean in unoccupied spaces.
   h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
   i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
   j. Remove labels that are not permanent.
   k. Touch up and otherwise repair and restore marred, exposed finishes and surfaces that cannot be satisfactorily repaired or restored, or that already show evidence of repair or restoration. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
   l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
   m. Replace parts subject to unusual operating conditions.
   n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
   o. Replace all disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
   p. Clean ducts, blowers and coils if units were operated without filters during construction. Operation of units without filters is not permitted.
   q. Leave Project clean and ready for occupancy.

C. Final Paperwork: Prior to final payment, Contractor shall deliver the following items to the Architect

1. Contractor's written one (1) year warranty of materials and workmanship
2. All guarantees, warranties, and copies of all returned submittals and RFIs
3. Receipts for extra materials delivered to the Owner
4. One set of "As-Built" Drawings consisting of a complete set of Construction Drawings which have been revised to reflect any changes made in the field.

D. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects and other pests. Prepare a report.

E. 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 all waste materials from Project site and dispose of lawfully.

END OF SECTION

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
1. Operation and maintenance documentation directory
2. Emergency manuals
3. Operation manuals for systems, subsystems and equipment
4. Maintenance manuals for the care and maintenance of products, materials and finishes, systems and equipment

B. Related Sections include the following:
1. Division 1 Section "Submittal Procedures"
2. Division 1 Section "Closeout Procedures"
3. Division 1 Section "Project Record Documents"
4 Division 2-33 Sections for specific operation and maintenance manual requirements for the Work in those Sections

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment or subsystems united by regular interaction

B. Sub-system: A portion of a system with characteristics similar to a system

1.4 SUBMITTALS

A. Initial Submittal: Submit 2 draft copies of each manual at least 15 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Architect will return one copy of draft and mark whether general scope and content of manual are acceptable.

B. Final Submittal: Submit one copy of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection. Correct or modify each manual to comply with Architect's comments. Submit 4 copies of each corrected manual within 15 days of receipt of Architect's comments.

1.5 COORDINATION

A. Where operation and maintenance documentation includes information on installations by more than one factory authorized service representative, assemble and coordinate information furnished by representative and prepare manuals.

B. Operation and Maintenance documentation shall contain accurate "Record Set" information to permit the St. Johns River State College Maintenance personnel to take over maintenance with instruction sufficient to ensure operation and maintenance in accordance with manufacturer's specifications.

PART 2 – PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:
1. List of documents
2. List of systems
3. List of equipment
4. Table of contents

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with the same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHARE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems".

2.2 MANUALS, GENERAL

A. Manuals shall contain only information on systems and products installed

B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
1. Title Page
2. Table of Contents
3. Manual Contents

C. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
1. Subject matter included in manual
2. Name and address of Project
3. Name and address of Owner
4. Date of submittal
5. Name, address and telephone number of Contractor
6. Name and address of Architect
7. Cross reference to related systems in other operation and maintenance manuals

D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set

E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem and equipment. If possible, assemble instructions or subsystems, equipment and components of one system into a single binder
1. Binders: Heavy duty, 3 ring, vinyl covered, loose leaf binders, in thickness necessary to accommodate contents, sized to hold 8 ½ x 11 inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets
   a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by a subsystem and related components. Cross reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system
   b. Identify each binder on front and spine with printed title "OPERATION AND MAINTENANCE MANUAL", Project title or name and subject matter of contents. Indicate volume number for multiple volume sets.
2. Dividers: Heavy paper dividers with plastic covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
4. Supplementary Text: Prepared on 8 ½ x 11 inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts

b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawings titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:
1. Type of emergency
2. Emergency instructions
3. Emergency procedures

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire
2. Flood
3. Gas Leak
4. Water Leak
5. Power Failure
6. Water Outage
7. System, subsystem, or equipment failure
8. Chemical release or spill

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping
2. Shutdown instructions for each type of emergency
3. Operating instructions for conditions outside normal operating limits
4. Required sequences for electric or electronic systems
5. Special operating instructions and procedures

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem and equipment descriptions
2. Performance and design criteria if Contractor is delegated design responsibility
3. Operating standards
4. Operating procedures
5. Operating logs
6. Wiring diagrams
7. Control diagrams
8. Piped system diagrams
9. Precautions against improper use
10. License against improper use

B. Descriptions: Include the following:
1. Product name and model number
2. Manufacturer's name
3. Equipment identification with serial number of each component
4. Equipment function
5. Operating characteristics
6. Limiting conditions
7. Performance curves
8. Engineering data and tests
9. Complete nomenclature and number of replacement parts

C. Operating Procedures: Include the following, as applicable:
1. Startup procedures
2. Equipment or system operating instructions
3. Routine and normal operating instructions
4. Regulation and control procedures

5. Instructions on stopping
6. Normal shutdown instructions
7. Seasonal and weekend operating instructions
8. Required sequences for electric or electronic systems
9. Special operating instructions and procedures

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed

E. Piped Systems: Diagram piping as installed, and identify color coding where required for identification

2.5 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross reference Specification Section number and title in Project Manual

C. Product Information: Include the following, as applicable:
1. Product name and model number
2. Manufacturer's name
3. Color, pattern and texture
4. Material and chemical composition
5. Re-ordering information for specially manufactured products

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures
2. Types of cleaning agents to be used and methods of cleaning
3. List of cleaning agents and methods of cleaning detrimental to product
4. Schedule for routine cleaning and maintenance
5. Repair instructions

E. Contractor shall consolidate manufacturer's schedules with a single master schedule for required maintenance

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address and telephone number of Installer or supplier and maintenance service agent, and cross reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
1. Standard printed maintenance instructions and bulletins
2. Drawings, diagrams and instructions required for maintenance, including disassembly and component removal, replacement and assembly
3. Identification and nomenclature of parts and components
4. List of items recommended to be stocked as spare parts

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
   1. Test and inspection instructions
   2. Troubleshooting guide
   3. Precautions against improper maintenance
   4. Disassembly; component removal, repair and replacement; reassembly instructions
   5. Aligning, adjusting and checking instructions
   6. Demonstration and training DVD, if available

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
   1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semi-annual and annual frequencies
   2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds. Include procedures to follow and required notifications for warranty claims.

PART 3 – EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation and maintenance manuals

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem and piece of equipment not part of a system.
   1. Engage a factory authorized service representative to assemble and prepare information for each system, subsystem and piece of equipment not part of a system
   2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel

E. Manufacturer's Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data includes more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
   1. Prepare supplementary text if manufacturers' standard printed data are not available and where information is necessary for proper operation and maintenance of equipment of systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of installation.
   1. Do not use original Product Record Documents as part of operation and maintenance manuals
   2. Comply with requirements of newly prepare Record Drawings in Division 1 Section "Project Record Documents"

G. Comply with Division 1 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
1. Throughout progress of the Work of this Contract, maintain an accurate record of all changes in the Contract Documents, as described in Article 3.1 below.
2. Upon completion of the Work of this Contract, transfer the recorded changes to a set of Record Documents, as described in Article 3.2 below.

B. Related Work Described Elsewhere:
1. Section 01 33 00, Submittals
2. Division 21, Fire Suppression
3. Division 22, Plumbing
4. Division 23, Mechanical
5. Division 26, Electrical
6. Division 27, Communications
7. Division 28, Electronic Safety and Security

1.2 QUALITY ASSURANCE

A. General: Delegate the responsibility for maintenance of Record Documents to one person on the Contractor's staff as approved in advance by the Architect.

B. Accuracy of Records: Thoroughly coordinate all changes within the Record Documents, making adequate and proper entries on each page of Specifications and each sheet of Drawings and other Documents where such entry is required to properly show the change. Accuracy of records shall be such that future searches for items shown in the Contract Documents may reasonably rely on information obtained from the approved Record Documents.

C. Timing of Entries: Make all entries within 24 hours after receipt of information.

1.3 SUBMITTALS

A. General: The Architect's approval of the current status of Record Documents will be a prerequisite to his approval of requests for progress payment and request for final payment under the Contract.

B. Progress Submittals: Prior to submitting each request for progress payment, secure the Architect's approval of the Record Documents as currently maintained.

C. Final Submittal: Prior to submitting request for final payment, submit the final Record Documents to the Architect and secure his approval.

1.4 PRODUCT HANDLING

A. Use all means necessary to maintain the job set of Record Documents completely protected from deterioration and from loss and damage until completion of the Work and transfer of the recorded data to the final Record Documents. In the event of loss of recorded data, use all means necessary to secure the data to the Architect's approval; such means shall include, if necessary in the opinion of the Architect, removal and replacement of concealing materials and, in such case, all replacements shall be to the standards originally specified in the Contract Documents.

PART 2 - PRODUCTS

2.1 RECORD DOCUMENTS

A. Job Set: Promptly following award of Contract, secure from the Architect, at no charge to the Contractor, one complete set of all documents comprising the Contract.

PART 3 - EXECUTION

3.1 MAINTENANCE OF JOB SET

A. Identification: Immediately upon receipt of the job set described in Paragraph 2.1A above, identify each of the documents with the title "RECORD DOCUMENTS - JOB SET".

B. Preservation:
1. Considering the Contract completion time, the probable number of occasions upon which the job set must be taken out for new entries and for examination, and the conditions under which these activities will be performed, devise a suitable method for protecting the job set to the approval of the Architect.
2. Do not use the job set for any purpose except entry of new data and for review by the Architect, until start of transfer of data to final Record Documents.
3. Maintain the job set at the site of Work as that site is designated by the Architect.

C. Making Entries on Drawings: Using an erasable colored pencil (not ink or indelible pencil), clearly describe the change by note and by graphic line, as required. Date all entries. Call attention to the entry by a "cloud" around the area or areas affected. In the event of overlapping changes, different colors may be used for each of the changes.

D. Making Entries on Other Documents:
1. Where changes are caused by directives issued by the Architect, clearly indicate the change by note in ink, colored pencil, or rubber stamp.
2. Where changes are caused by Contractor originated proposals approved by the Architect, including inadvertent errors by the Contractor which have been accepted by the Architect, clearly indicate the change by note in erasable colored pencil.
3. Make entries in the pertinent documents as approved by the Architect.

E. Conversion of Schematic Layouts:
1. In most cases on the drawings, arrangement of conduits and circuits, piping, ducts, and other similar items, is shown schematically and is not intended to portray precise physical layout. Final physical arrangement is as determined by the Contractor, subject to the Architect's approval. However, design of future modifications of the facility may require accurate information as to the final physical arrangement of items which are shown only schematically on the drawings.
2. Show on the job set of Record Drawings, by dimension accurate to within 1", the center line of each run of items such as described in Paragraph E.1 above. Clearly identify the item by accurate note such as "cast iron drain", "galv. water", etc. Show by symbol or note, the vertical location of the item ("under slab", "in ceiling plenum", "exposed", etc.). Make all identification sufficiently descriptive that it may be related reliably to the specifications.
3. The Architect may waive the requirements for conversion of schematic data where, in the Architect's judgment, such conversion serves no beneficial purpose. However, do not rely upon waivers being issued except as specifically issued in writing by the Architect.
4. Timing of Entries: Be alert to changes in the work from how it is shown in the Contract Documents. Promptly, and in no case later than 24 hours after the change has occurred and been made known to the Contractor, make the entry or entries required.
5. Accuracy of entries: Use all means necessary, including the proper tools for measurement, to determine actual locations of the installed items.

3.2 FINAL RECORD DOCUMENTS

A. General: The purpose of the final Record Documents is to provide factual information regarding all aspects of the work, both concealed and visible, to enable future modification of design to proceed safely without lengthy and expensive site measurement, investigation, and examination.

B. Transfer of Data to Drawings: Carefully transfer all change data shown on the job set of Record Drawings to corresponding final record set of prints, coordinating the changes as required, and clearly indicating at each affected detail and other drawing the full description of all changes made during construction and the actual location of items. Call attention to each entry by drawing a "cloud" around the area or areas affected. Make all change entries on the drawings neatly, consistently, and in ink or crisp black pencil.

C. Transfer of Data to Other Documents: If the Documents other than Drawings have been kept clean successfully during progress of the Work, and if entries have been sufficiently orderly thereon to the approval of the Architect, the job set of those documents (other than drawings) will be accepted by the Architect as final Record Documents for those Documents. If any such Document is not so approved by the Architect, secure a new copy of that document from the Architect as the Architect's usual charge for reproduction; carefully transfer the change data to the new copy and to the approval of the Architect.

D. Review and Approval: Submit the completed total set of Record Documents to the Architect as described in Paragraph 1.3C above. Participate in review meeting or meetings as required by the Architect, make all required changes in the Record Documents to the Architect.

END OF SECTION

SECTION 01 79 00

DEMONSTRATION AND TRAINING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
1. Demonstration of operation of systems, subsystems and equipment
2. Training in operation and maintenance of systems, subsystems and equipment
3. Demonstration and training DVDs

B. Related Sections:
1. Divisions 2 through 33 Sections for specific requirements for demonstration and training for products in those Sections

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program of demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time and instructor's names for each training module. Include learning objective and outline for each training module.
1. Indicate proposed training modules utilizing manufacturer produced demonstration and training DVD for systems, equipment and products in lieu of live instruction module

B. Qualification Data: For instructor

C. Attendance Record: For each training module, submit list of participants and length of instruction time

D. Evaluations: For each participant and for each training module, submit results and documentation of performance based tests.

1.4 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within 7 days of end of each training module.
1. Identification: On each copy, provide an applied label with the following information:
a. Name of Project
b. Name and address of videographer
c. Name of Architect
d. Name of Contractor
e. Date of recording
2. Transcript: Prepared on 8 ½ x 11 inch paper, punched and bound in heavy duty, 3 ring, vinyl covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding DVD. Include name of Project and date of recording on each page.
3. At completion of training, submit complete training manual(s) for Owner's use.

1.5 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory authorized service representative, complying with requirements in Division 1 Section "Quality Requirements", experienced in operation and maintenance procedures and training.

C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.

D. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination". Review methods and procedures related to demonstration and training including, but not limited to, the following:
   1. Inspect and discuss locations and other facilities required for instruction
   2. Review and finalize instruction schedule and verify availability of educational materials, instructor personnel, audiovisual equipment and facilities needed to avoid delays
   3. Review required content of instruction
   4. For instruction that must occur outside, review forecasted weather conditions and procedures to follow if conditions are unfavorable

1.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time and course content.

C. Coordinate content of training modules with content of approved emergency, operation and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by the Architect.

PART 2 – PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that each participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment or component as required by the Contract Documents:
   1. Operational and Maintenance Requirements and Criteria
      a. Calibration Strategy for Outdoor Exhaust Dampers
      b. Carbon Dioxide Monitoring Protocol
      c. Carbon Monoxide Monitoring Protocol
      d. Chemical Management and Minimization Policy
      e. Energy Metering Report Plan
      f. Low Impact Site and Green Building Exterior Management Plan
      g. Operation Schedule for EPA Water Sense/Smart Water Applications, Smart Controllers and Rain Shut off Devices
      h. Integrated Pest Management Plan
      i. Site Maintenance Contracts
      j. Waste Minimization Plan
      k. Water Efficiency and Verification Plan
      l. Schedule for HVAC and Filter Maintenance
      m. General Sustainable Housekeeping
   2. Documentation: Review the following items in detail:
      a. Emergency manuals
      b. Operations manuals
      c. Maintenance manuals
      d. Project record documents
      e. Identification systems
      f. Warranties and bonds
      g. Maintenance service agreements and similar continuing commitments
   3. Emergencies: Include the following, as applicable:
      a. Instructions on meanings of warnings, trouble indications and error messages
      b. Instructions on stopping
      c. Shutdown instructions for each type of emergency
      d. Operating instructions for conditions outside of normal operating limits
      e. Sequences for electric or electronic systems

f. Special operating instructions and procedures

4. Operations: Include the following, as applicable:
   a. Startup procedures
   b. Equipment or system break-in procedures
   c. Routine and normal operating instructions
   d. Regulation and control procedures
   e. Control sequences
   f. Safety procedures
   g. Instructions on stopping
   h. Normal shutdown instructions
   i. Operating procedures for emergencies
   j. Operating procedures for system, subsystem or equipment failure
   k. Seasonal and weekend operating instructions
   l. Required sequences for electric or electronic systems
   m. Special operating instructions and procedures
5. Adjustments: Include the following:
   a. Alignments
   b. Checking adjustments
   c. Noise and vibration adjustments
   d. Economy and efficiency adjustments
6. Troubleshooting: Include the following:
   a. Diagnostic instructions
   b. Test and inspection procedures
7. Maintenance: Include the following:
   a. Inspection procedures
   b. Types of cleaning agents to be used and methods of cleaning
   c. List of cleaning agents and methods of cleaning detrimental to product
   d. Procedures for routine cleaning
   e. Procedures for preventive maintenance
   f. Procedures for routine maintenance
   g. Instructions on use of special tools
8. Repairs: Include the following:
   a. Diagnosis instructions
   b. Repair instructions
   c. Disassembly; component removal, repair and replacement; reassembly instructions
   d. Instructions for identifying parts and components
   e. Review of spare parts needed for operation and maintenance

PART 3 – EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Division 1 Section "Operations and Maintenance Data".

B. Set up instructional equipment at instruction location

3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors and to coordinate between Contractor and Owner for number of participants, instruction times and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate and maintain systems, subsystems and equipment not part of a system.
   1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria and regulatory requirements
   2. Owner will furnish instructor to describe Owner's operational philosophy
   3. Owner will furnish Contractor with names and positions of participants

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
   1. Schedule training with Owner at least seven days in advance

D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a written performance based test..

E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing prior to training use.

3.3 DEMONSTRATION AND TRAINING DVDS

A. General: Engage a qualified commercial videographer to record demonstration and training DVDs. Record each module separately. Include classroom instructions and demonstrations, board diagrams and other visual aids, but not student practice.
   1. At beginning of each training module, record each chart containing learning objective and lesson outline

B. Format: Provide high quality color DVD with menu navigation

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.

D. Transcript: Provide a transcript of the narration. Display images and running time captured from recording opposite the corresponding narration segment.

E. Pre-Produced Recordings: Provide recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION

Project Manual

EXCERPT INCL:
DIVISION 02 EXISTING CONDITIONS
DIVISION 03 CONCRETE
DIVISION 04 MASONRY
DIVISION 05 METAL
DIVISION 06 WOOD AND PLASTIC

BID NUMBER – BID-SJR-06-2018

Renovation with Addition To Building V, St. Augustine Campus

2990 College Drive
St. Augustine, Florida 32084

TO BE CONSTRUCTED FOR:

ST. JOHNS RIVER STATE COLLEGE

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TECHNICAL PROVISIONS

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SECTION 02 30 00 SUBSURFACE INVESTIGATION

PART 1 – SOIL INVESTIGATION DATA

1.1 INVESTIGATION

A. An investigation of substrate soil conditions at the building site was authorized by the Owner. The investigation was made by Universal Engineering Service, Inc. and dated December 14, 2018.

1.2 REPORT

A. Subsurface Investigation Program, boring location map and logs of test borings are bound herein for information only.

B. Report and log of soil borings is available for all bidders, and may be found behind this Section. The requirements in this report are a part of the project. The report is not a warranty of subsurface conditions.

1.3 INTERPRETATION

A. Bidders are expected to examine the site and the subsurface investigation reports, then decide for themselves the character of materials to be encountered.

B. The Owner and the Architect/Engineer disclaim any responsibility for the accuracy, true location and extent of the soils investigation that has been prepared by others. They further disclaim responsibility for the interpretation of the data by Bidders, as in projecting soil bearing values, soil stability, and the presence, level, ad extent of underground water.

END OF SECTION

UNIVERSAL
ENGINEERING SCIENCES

REPORT OF A GEOTECHNICAL EXPLORATION

St. Johns River State College Student Services Building Addition
St. Augustine, Florida

December 14, 2018

PROJECT NO. 0930.1800265.0000
REPORT NO. 1631220

Prepared For:

Akel, Logan & Shafer
704 Rosselle Street
Jacksonville, Florida 32204

Prepared By:

UNIVERSAL ENGINEERING SCIENCES
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- West Palm Beach

December 14, 2018

Akel, Logan & Shafer
704 Rosselle Street
Jacksonville, Florida 32204

Attention: Ms. Melody Bishop

Reference: **REPORT OF A GEOTECHNICAL EXPLORATION**
St. Johns River State College Student Services Building Addition
St. Augustine, Florida
UES Report No. 1631220

Dear Ms. Bishop:

Universal Engineering Sciences, Inc. (UES) has completed a geotechnical exploration at the site of the proposed project located St. Augustine, This report presents the results of our subsurface exploration, an engineering evaluation with respect to the project characteristics described to us, and recommendations for groundwater control, foundation design, and site preparation. A summary of our findings is as follows:

- The borings generally encountered loose to medium dense fine sand (SP) and slightly silty fine sand (SP-SM) in the upper 7.5 to 9 feet underlain by medium dense to very dense fine sand with trace to many shell fragments (SP) to the deepest boring termination depth of 50 feet. As exceptions, boring B-1 encountered very loose silty fine sand (SM) at a depth range of 5 to 8 feet and boring B-3 encountered very loose fine sand (SP) at a depth range of 7.5 to 9.8 feet.

- The stabilized groundwater level was encountered at depths ranging from 2.9 to 3.5 feet below the existing grade at the time of drilling. We estimate the seasonal high groundwater level will occur approximately 1.5 to 2 feet below the existing ground surface at the time of our exploration.

- Assuming the building addition will be constructed in accordance with our Site Preparation Recommendations, we have recommended the proposed structure addition be supported on a conventional, shallow spread foundation system with an allowable soil bearing pressure of 2,500 pounds per square foot.

- We recommend normal, good practice site preparation techniques to prepare the existing subgrade to support the proposed structure addition. These techniques include stripping the construction areas of any topsoil and vegetation; compacting the subgrade with a vibratory drum roller, and placing engineered fill to the desired grades

We trust this report meets yours needs and addresses the geotechnical issues associated with the proposed construction. We appreciate the opportunity to have worked with you on this project and look forward to a continued association. Please do not hesitate to contact us if you should have any questions, or if we may further assist you as your plans proceed.

Respectfully submitted,

UNIVERSAL ENGINEERING SCIENCES, INC.

Stephen R. Weaver, P.E.
Geotechnical Services Manager
FL P.E. Number 37389
Date: 12/14/18

SRW/sw

Jacob Fuller
Staff Geotechnical Engineer

TABLE OF CONTENTS

1.0 INTRODUCTION

In this report, we present the results of the subsurface exploration of the site for the proposed project located in St. Augustine, Florida. We have divided this report into the following sections:

- SCOPE OF SERVICES - Defines what we did
- FINDINGS - Describes what we encountered
- RECOMMENDATIONS - Describes what we encourage you to do
- LIMITATIONS - Describes the restrictions inherent in this report
- APPENDICES - Presents support materials referenced in this report

2.0 SCOPE OF SERVICES

2.1 PROJECT DESCRIPTION

Project information was provided to us in recent correspondence with you. We were provided with a copy of a Google Earth aerial showing an the layout of the proposed construction overlain on the existing site layout.

We understand that the project consists of construction of an addition to the student services building at the St. Johns River State College St. Augustine campus. The addition will be a one-story structure with a plan area of 5,000 square feet. Detailed structural loading information has not been provided to us, therefore we assume maximum column and wall loads will not exceed 75 kips and 3 klf, respectively. Detailed grading information has not been provided, therefore we assume maximum elevating fill heights will generally not exceed 2 feet, with the exception that up to four feet of fill may be required in the area of the existing truck well.

Our recommendations are based upon the above considerations. If any of this information is incorrect, or if you anticipate any changes, please inform Universal Engineering Sciences so that we may review and revise our recommendations, as necessary.

2.2 PURPOSE

The purposes of this geotechnical exploration were:

- to explore the general subsurface conditions at the site;
- to interpret and evaluate the subsurface conditions with respect to the proposed construction; and
- to provide geotechnical engineering recommendations for groundwater control, foundation design, and site preparation.

This report presents an evaluation of site conditions on the basis of traditional geotechnical procedures for site characterization. The recovered samples were not examined, either visually

or analytically, for chemical composition or environmental hazards. Universal Engineering Sciences would be pleased to perform these services, if you desire.

Our exploration was confined to the zone of soil likely to be stressed by the proposed construction. Our work did not address the potential for surface expression of deep geological conditions. This evaluation requires a more extensive range of field services than performed in this study. We will be pleased to conduct an investigation to evaluate the probable effect of the regional geology upon the proposed construction, if you desire.

2.3 FIELD EXPLORATION

A field exploration was performed on December 5, 2018. The approximate boring locations are shown on the Boring Location Plan in Appendix A. The approximate boring locations were determined in the field by our personnel using taped measurements from existing site features shown on the Site Plan furnished to us and should be considered accurate only to the degree implied by the method of measurement used. Samples of the soils encountered will be held in our laboratory for your inspection for 60 days unless we are notified otherwise.

2.3.1 SPT Borings

To explore the subsurface conditions within the area of the proposed structure addition, we located and drilled three (3) Standard Penetration Test (SPT) borings to depths of approximately 20 to 50 feet below the existing ground surface in general accordance with the methodology outlined in ASTM D 1586. A summary of this field procedure is included in Appendix A. Split-spoon soil samples recovered during performance of the borings were visually classified in the field and representative portions of the samples were transported to our laboratory for further evaluation.

2.4 LABORATORY TESTING

Representative soil samples obtained during our field exploration were returned to our office and examined by a geotechnical engineer. The samples were visually classified in general accordance with ASTM D 2488 (Unified Soil Classification System).

Five (5) fines content tests and five (5) moisture content tests were conducted in the laboratory on representative soil samples obtained from the borings. These tests were performed to aid in classifying the soils and to help quantify and correlate engineering properties. The results of these tests are presented on the Boring Logs in Appendix A. A brief description of the laboratory procedures used is also provided in Appendix A.

3.0 FINDINGS

3.1 SOIL SURVEY

Based on the Soil Survey data for St. Johns County, Florida, as prepared by the US Department of Agriculture Soil Conservation Service, the predominant predevelopment soil types at the site

are identified as Immokalee (7) and Paola (23). A summary of characteristics of this soil series was obtained from the Soil Survey and is included in Table 1.

TABLE 1
Summary of Soil Survey Information

Soil Type	Constituents	Hydrologic Group	Natural Drainage	Soil Permeability (Inches/Hr)	Seasonal High Water Table
Immokalee (7)	0-8" Fine sand 8-80" Fine sand, sand	B/D	Poorly Drained	0-40" 6.0-20 40-64" 0.6-2.0 64-80" 6.0-20	0 – 1.0
Paola (23)	0-17" Fine sand 17-80" Sand, fine sand	A	Excessively Drained	0-17" >20 17-80" >20	>6.0

3.2 SURFACE CONDITIONS

The site of the proposed project is located on the east side of Kenton Morrison Road at the existing St. Johns River State College campus in St. Augustine, FL. The site of the proposed building addition is to the south of the existing student services building and will partially extend into the parking area just south of the existing building. The area is mostly paved with grass areas on the east and west of the paved area and is visually relatively level except for the truck well area to the south of the existing building which is approximately 3 feet lower. The existing building visually appears to be in relatively good condition.

3.3 SUBSURFACE CONDITIONS

The boring locations and detailed subsurface conditions are presented in Appendix A: Boring Location Plan and Boring Logs. The classifications and descriptions shown on the logs are based upon visual characterizations of the recovered soil samples. Also, see Appendix A: Key to Boring Logs, for further explanation of the symbols and placement of data on the Boring Logs.

3.3.1 Soil Conditions

Table 2: General Soil Profile summarizes the soil conditions encountered.

TABLE 2 General Soil Profile		
Typical depth (ft)		Soil Descriptions
From	To	
0	7.5 to 9	Loose to medium dense fine sand (SP) and slightly silty fine sand (SP-SM)
7.5 to 9	50*	Medium dense to very dense fine sand with trace to many shell fragments (SP)
* Termination Depth of Deepest Boring ( ) Indicates Unified Soil Classification		

As exceptions, boring B-1 encountered very loose silty fine sand (SM) at a depth range of 5 to 8 feet and boring B-3 encountered very loose fine sand (SP) at a depth range of 7.5 to 9.8 feet.

The stabilized groundwater level was encountered at depths ranging from 2.9 to 3.5 feet below the existing grade at the time of drilling. We estimate the seasonal high groundwater level will occur approximately 1.5 to 2 feet below the existing ground surface at the time of our exploration.

4.0 RECOMMENDATIONS

4.1 GENERAL

In this section of the report, we present our detailed recommendations for groundwater control, building addition foundation, site preparation, and construction related services. The following recommendations are made based upon a review of the attached soil test data, our understanding of the proposed construction, and experience with similar projects and subsurface conditions. We recommend that UES be provided the opportunity to review the project plans and specifications to confirm that our recommendations have been properly interpreted and implemented. If the structural loadings or the building location changes significantly from that discussed previously, we request the opportunity to review and possibly amend our recommendations with respect to those changes. The discovery of any subsurface conditions during construction which deviate from those encountered in the borings should be reported to us immediately for observation, evaluation and recommendations.

4.2 GROUNDWATER CONTROL

The groundwater table will fluctuate seasonally depending upon local rainfall. The rainy season in northeast Florida is normally between June and September. Based upon our review of U.S.G.S. data, Duval County Soils Survey and regional hydrogeology, it is our opinion the seasonal high groundwater level will occur 1.5 to 2 feet below the existing ground surface at the time of our exploration.

Note that it is possible the estimated seasonal high groundwater levels will temporarily exceed these estimated levels during any given year in the future. Should impediments to surface water drainage exist on the site or should rainfall intensity and duration, or total rainfall quantities exceed the normally anticipated rainfall quantities, groundwater levels may exceed our seasonal high estimates. We recommend positive drainage be established and maintained as needed on the site during construction. We further recommend permanent measures be constructed to maintain positive drainage away from the proposed structures throughout the life of the project.

We recommend all foundation and pavement grade designs be based on the seasonal high groundwater conditions.

4.3 BUILDING FOUNDATION

Based on the results of our exploration, we consider the subsurface conditions at the site adaptable for support of the proposed structure additions when constructed on a properly designed conventional shallow foundation system. Provided the site preparation and earthwork construction recommendations outlined in Section 4.5 of this report are performed, the following parameters may be used for foundation design.

4.3.1 Bearing Pressure

The maximum allowable net soil bearing pressure for use in shallow foundation design should not exceed 2,500 psf. Net bearing pressure is defined as the soil bearing pressure at the foundation bearing level in excess of the natural overburden pressure at that level. The foundations should be designed based on the maximum load which could be imposed by all loading conditions.

4.3.2 Foundation Size

The minimum widths recommended for any isolated column footings and continuous wall footings are 24 inches and 18 inches, respectively. Even though the maximum allowable soil bearing pressure may not be achieved, these width recommendations should control the minimum size of the foundations.

4.3.3 Bearing Depth

The exterior foundations should bear at a depth of at least 18 inches below the finished exterior grades and the interior foundations should bear at a depth of at least 12 inches below the finish floor elevation to provide confinement to the bearing level soils. It is recommended that stormwater be diverted away from the building exteriors to reduce the possibility of erosion beneath the exterior footings.

4.3.4 Bearing Material

The foundations may bear in either the compacted suitable natural soils or compacted structural fill. The bearing level soils, after compaction, should exhibit densities equivalent to at least 95

percent of the Modified Proctor maximum dry density (ASTM D 1557) to a depth of at least one foot below the foundation bearing level.

4.3.5 Stabilization of Existing Foundations

During excavation of the proposed footings in close proximity to footings supporting the existing structure, it may be required to stabilize the existing footings to preclude settlement of the existing structure. If warranted, the stabilization of the existing footings should be the responsibility of the contractor, but could include bracing/shoring, underpinning, and/or chemical grouting.

4.3.6 Foundation Considerations

The foundations in areas adjacent to the existing structure may need special consideration. It is recommended that the additions be structurally independent of the existing building, since the additional loads of the structure addition on existing footings may cause detrimental settlement and unsightly cracking. For the same reason, new footings should be located in such a way that the stresses under new footings will not overstress the soil under existing footings. This problem applies to new footings in the critical zone which extends about 5 feet laterally from the existing footings.

4.3.7 Settlement Estimates

Post-construction settlements of the structure addition will be influenced by several interrelated factors, such as (1) subsurface stratification and strength/compressibility characteristics; (2) footing size, bearing level, applied loads, and resulting bearing pressures beneath the foundations; and (3) site preparation and earthwork construction techniques used by the contractor. Our settlement estimates for the structure addition are based on the use of site preparation/earthwork construction techniques as recommended in Section 4.5 of this report. Any deviation from these recommendations could result in an increase in the estimated post-construction settlements of the structure addition.

Due to the sandy nature of the near-surface soils, we expect the majority of settlement to occur in an elastic manner and fairly rapidly during construction. Using the recommended maximum bearing pressure, the assumed maximum structural loads and the field data which we have correlated to geotechnical strength and compressibility characteristics of the subsurface soils, we estimate that total settlements of the structure addition should be on the order of one inch or less.

Differential settlements result from differences in applied bearing pressures and variations in the compressibility characteristics of the subsurface soils. Because of the general uniformity of the subsurface conditions and the recommended site preparation and earthwork construction techniques outlined in Section 4.5, we anticipate that differential settlements of the structure addition should be on the order of ½ inch or less. It should be anticipated that differential settlements on the order of 1 inch could occur between foundations supporting the proposed addition and the existing structure.

4.3.8 Floor Slab

The floor slabs can be constructed as a slab-on-grade member using a modulus of subgrade reaction (K) of 100 pounds per cubic inch (pci) provided the subgrade materials are compacted as outlined in Section 4.5. It is recommended the floor slab bearing soils be covered with an impervious membrane to reduce moisture entry and floor dampness. A 10-mil thick plastic membrane is commonly used for this purpose. Care should be exercised not to tear large sections of the membrane during placement of reinforcing steel and concrete.

4.4 SITE PREPARATION

We recommend normal, good practice site preparation procedures. These procedures include: removing the existing structures and associated utilities and foundations, trees and associated root systems from the construction areas, stripping the construction areas of topsoil and vegetation; compacting the subgrade with a vibratory drum roller and placing engineered fill to the desired grades. A more detailed synopsis of this work is as follows:

1. Prior to construction, the location of any existing underground utility lines within the construction area should be established. Provisions should then be made to relocate interfering utilities to appropriate locations. It should be noted that if underground pipes are not properly removed or plugged, they may serve as conduits for subsurface erosion which may subsequently lead to excessive settlement of overlying structure(s).

2. The stabilized groundwater level was encountered at depths ranging from 2.9 to 3.5 feet below the existing grade at the time of drilling. We estimate the seasonal high groundwater level will occur approximately 1.5 to 2 feet below the existing ground surface at the time of our exploration. The groundwater level should be maintained at least 1 foot below any excavations and 2 feet below the surface of any vibratory compaction procedures.

3. Remove existing utilities and pavements. Strip away the existing vegetation, topsoils and other deleterious materials from within the proposed construction limits. Root rake the exposed subgrade soils (in perpendicular directions) to a depth of at least 12 inches to help locate and remove large roots, extensive root systems and pieces of organic debris that may occur just below the ground surface. The surface stripping and root raking should be performed within and 5 feet beyond the perimeter of the proposed building addition areas. Expect typical stripping at this site to a depth of 6 to 12 inches more or less. Some isolated areas may require more than a foot of stripping or undercutting to remove the root systems of underbrush or trees.

4. Compact the subgrade from the surface with a medium weight vibratory drum roller (a 3- to 4-ton roller, static weight and 3- to 4-foot drum diameter) until you obtain a minimum density of at least 95 percent of the Modified Proctor maximum dry density (ASTM D-1557), to a depth of 2 feet below the compacted surface. The surface compaction should be conducted after making any required earthwork cuts but prior to fill placement. Typically, the soils should exhibit moisture contents within ± 2 percent of the Modified Proctor optimum moisture content during compaction. A minimum of eight (8) complete coverages

(in perpendicular directions) should be made in the building addition construction area with the roller to improve the uniformity and increase the density of the underlying sandy soils.

Should the bearing level soils experience pumping and soil strength loss during the compaction operations, compaction work should be immediately terminated and (1) the disturbed soils removed and backfilled with dry structural fill soils which are then compacted, or (2) the excess pore pressures within the disturbed soils allowed to dissipate before recompacting.

5. Care should be exercised to avoid damaging any nearby structures while the compaction operation is underway. The existing conditions of any adjacent structures should be documented with photographs and survey (if deemed necessary). Compaction should cease if deemed detrimental to the adjacent structures. Universal Engineering Sciences can provide vibration monitoring services to help document and evaluate the effects of the surface compaction operation on existing structures. In the absence of vibration monitoring it is recommended the vibratory roller remain a minimum of 50 feet from existing structures. Within this zone, use of a bulldozer or a vibratory roller operating in the static mode is recommended.

6. Test the subgrade for compaction in the building addition area at a frequency of not less than one test per 2,500 square feet, or a minimum of two test locations, whichever is greater.

7. Place fill material, as required. The fill should consist of an inorganic, non-plastic granular soil with less than 10 percent soil fines (relatively clean fine sand). Typically, the soils should exhibit moisture contents within ± 2 percent of the Modified Proctor optimum moisture content during compaction. Place fill in uniform 10- to 12-inch loose lifts and compact each lift to a minimum density of 95 percent of the Modified Proctor maximum dry density.

8. Perform compliance tests within the fill/backfill at a frequency of not less than one test per 2,500 square feet per lift in the building addition area, or at a minimum of two tests, whichever is greater.

9. Test all footing cuts for compaction to a depth of 2 feet. Additionally, we recommend you conduct density testing in every column footing, and every 100 linear feet in wall footings. Recompaction of the foundation excavation bearing level soils, if loosened by the excavation process, can probably be achieved by making several coverages with a light weight walk-behind vibratory sled or roller.

4.5 CONSTRUCTION RELATED SERVICES

We recommend the owner retain Universal Engineering Sciences to perform construction materials tests and observations on this project. Field tests and observations include verification of foundation and pavement subgrades by performing quality assurance tests on the placement of

compacted structural fill and pavement courses. We can also provide concrete testing, pavement section testing, structural steel testing, and general construction observation services.

The geotechnical engineering design does not end with the advertisement of the construction documents. The design is an on-going process throughout construction. Because of our familiarity with the site conditions and the intent of the engineering design, we are most qualified to address problems that might arise during construction in a timely and cost-effective manner.

5.0 LIMITATIONS

Our geotechnical exploration has been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. Universal Engineering (UES) is not responsible for any independent conclusions, interpretation, opinions or recommendations made by others based on the data contained in this report.

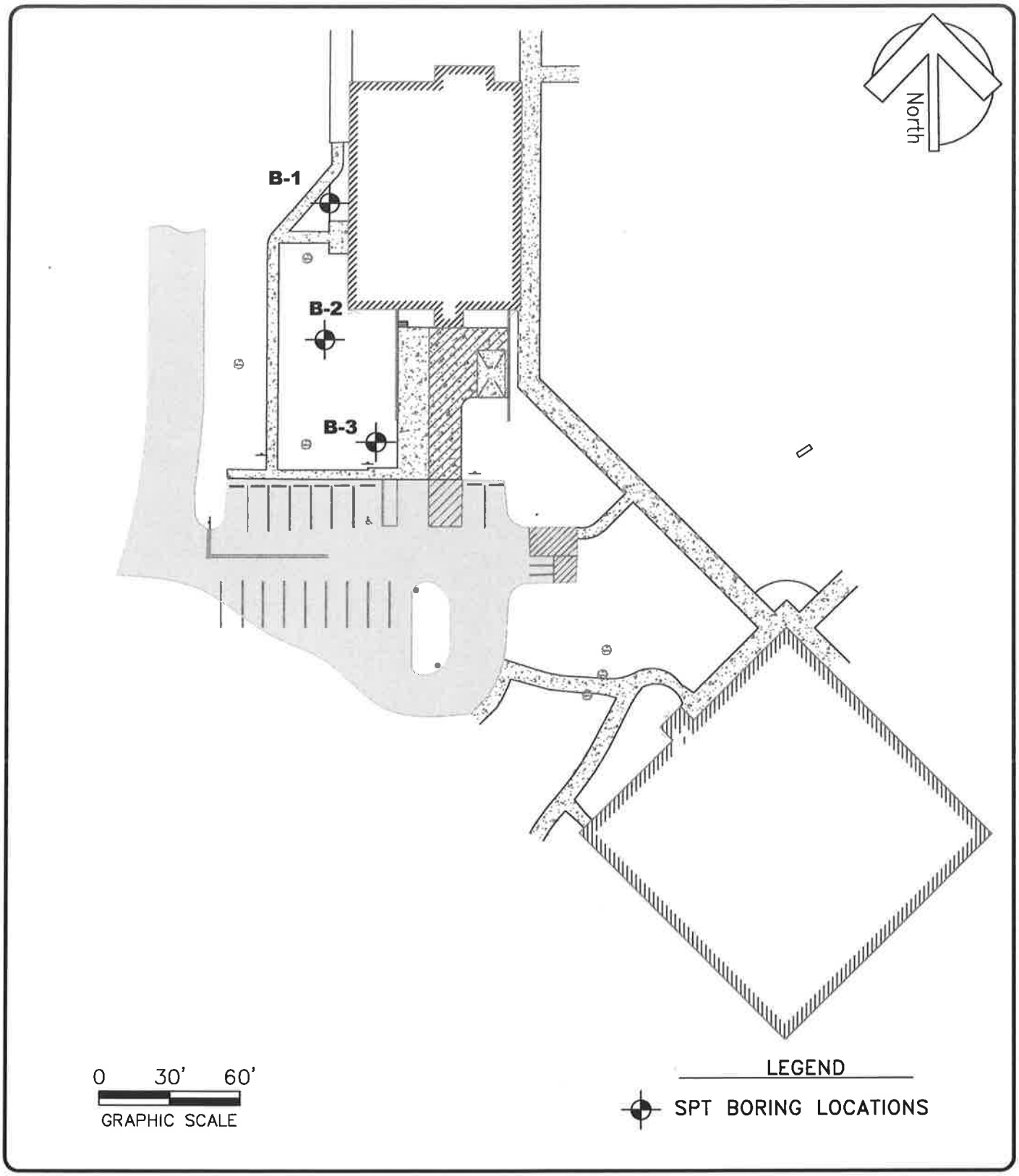
This report does not reflect any variations which may occur away from the soil borings. The discovery of any site or subsurface condition during construction which deviates from the data obtained during this geotechnical exploration should be reported to us for our evaluation. Also, in the event of any change to the location of the structures, please contact us so that we can review our recommendations.

During the early stages of most construction projects, geotechnical issues not addressed in this report may arise. Because of the natural limitations inherent in working with the subsurface, it is not possible for a geotechnical engineer to predict and address all possible problems. An Association of Engineering Firms Practicing in the Geosciences (ASFE) publication, "Important Information About Your Geotechnical Engineering Report" appears in Appendix B, and will help explain the nature of geotechnical issues.

Further, we present documents in Appendix B: Constraints and Restrictions, to bring to your attention the potential concerns and the basic limitations of a typical geotechnical report and the General Conditions under which our services are provided.

APPENDIX A

BORING LOCATION PLAN
SOIL BORING PROFILES
BORING LOGS
KEY TO BORING LOGS
FIELD EXPLORATION PROCEDURES
LABORATORY TESTING PROCEDURES

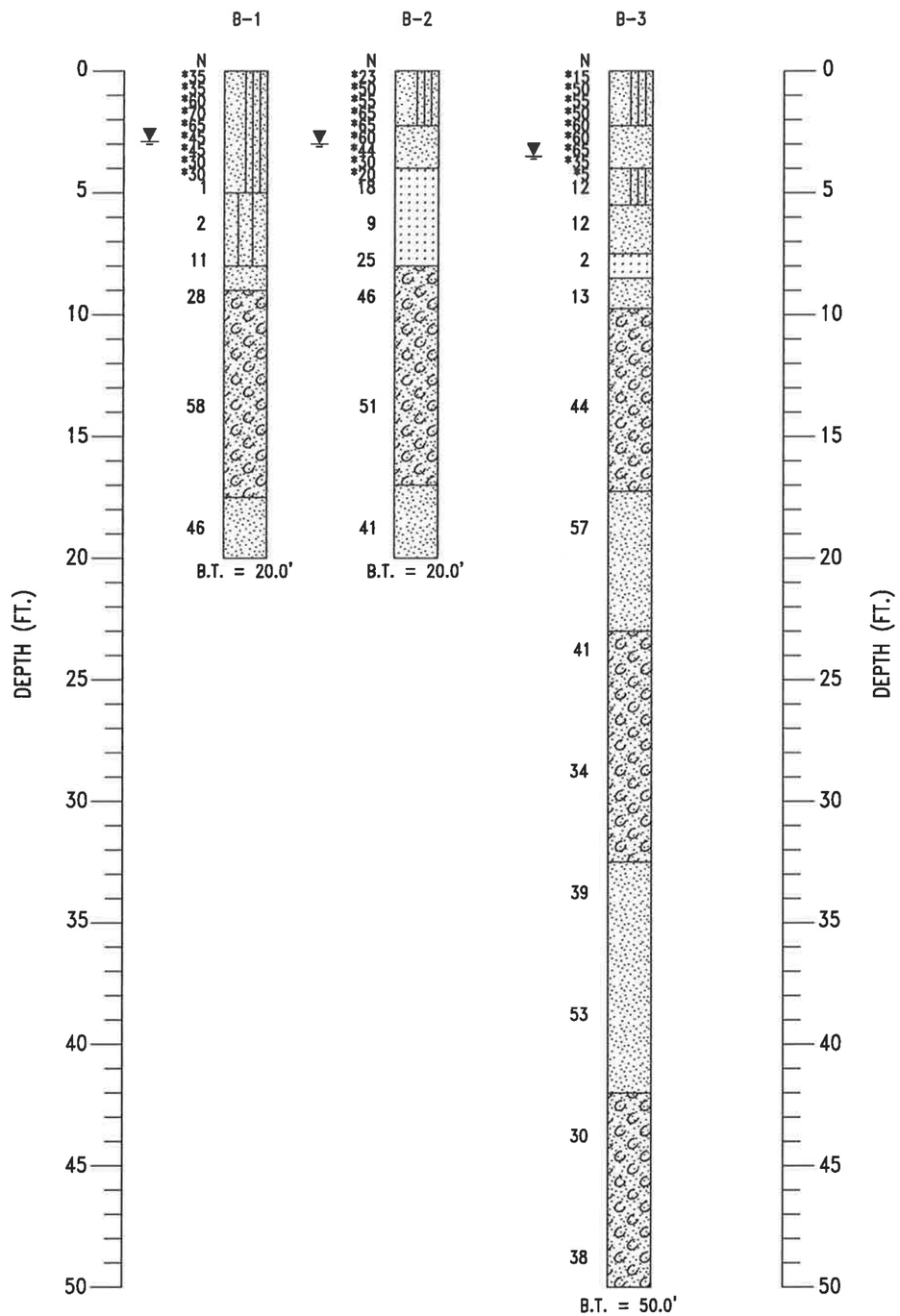


UNIVERSAL
ENGINEERING SCIENCES

GEOTECHNICAL EXPLORATION
ST. JOHNS RIVER STATE COLLEGE STUDENT SERVICES BUILDING ADDITION
ST. AUGUSTINE, FLORIDA

BORING LOCATION PLAN

REVISED BY:	TW	DATE:	12/13/18	CHECKED BY:	JF	DATE:	12/13/18
SCALE:	1"=60'	PROJECT NO:	0930.1800265.0000	REPORT NO:		PAGE NO:	A-1



LEGEND

- Sand (SP)
- Slightly Silty Sand (SP–SM)
- Slightly Silty Sand (Hardpan) (HP)
- Silty Sand (SM)
- Sand with Many Shell Fragments (SP)
- Groundwater Table
- BT Boring Termination Depth
- N SPT Blow Count

CLIENT: AKEL, LOGAN, AND SHAFER

DRAWN BY: TW | DATE: 12/14/18

CHECKED BY: JF | DATE: 12/14/18

SCALE: AS SHOWN

PROJECT NO: 0930.1800265.0000 | REPORT NO:

GEOTECHNICAL EXPLORATION
ST. JOHNS RIVER STATE COLLEGE STUDENT SERVICES BUILDING ADDITION
ST. AUGUSTINE, FLORIDA

SOIL BORING PROFILES

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PAGE NO:
FIGURE 1A

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BORING LOG

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PROJECT: GEOTECNICAL EXPLORATION
ST. JOHNS RIVER STATE COLLEGE STUDENT SERVICES BUILDING ADDITION
ST. AUGUSTINE, FLORIDA

BORING DESIGNATION: **B-1** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: AKEL, LOGAN AND SHAFER
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 2.9
DATE OF READING: 12/5/18
EST. W.S.W.T. (ft):

DATE STARTED: 12/5/18
DATE FINISHED: 12/5/18
DRILLED BY: S. TORRES
TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0			*35			Medium dense dark brown to gray slightly Silty fine SAND with some Shell fragments (SP-SM)						
			*35									
			*60									
			*70									
			*65									
			*45	▼								
			*45									
			*30									
			*30									
5						Very loose brown Silty fine SAND (SM)						
		1-1-1/12"	1									
		1-1	2									
						Medium dense brown fine SAND (SP)						
		1-5-6	11				2.6	21.2				
						Medium dense to very dense light gray fine SAND with many Shell fragments (SP)						
10		6-10-18	28									
15		10-26-32	58				2.5	21.9				
						Dense light brown fine SAND with trace Shell fragments (SP)						
20		12-18-28	46									

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BORING LOG

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PROJECT: GEOTECNICAL EXPLORATION
ST. JOHNS RIVER STATE COLLEGE STUDENT SERVICES BUILDING ADDITION
ST. AUGUSTINE, FLORIDA

BORING DESIGNATION: **B-2** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: AKEL, LOGAN AND SHAFER
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 3.0
DATE OF READING: 12/6/18
EST. W.S.W.T. (ft):

DATE STARTED: 12/6/18
DATE FINISHED: 12/6/18
DRILLED BY: S. TORRES
TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0			*23 *50 *55 *65 *65 *60 *44 *30 *20	▼		Loose to medium dense dark brown slightly Silty fine SAND (SP-SM)						
						Medium dense gray fine SAND (SP)						
						Medium dense to loose brown slightly Silty fine SAND (SP-SM) (Hardpan)						
5		7-10-8	18				6.4	25.4				
		5-4-5	9									
		5-11-14	25			Medium dense to very dense light gray fine SAND with many Shell fragments (SP)						
10		13-22-24	46									
15		16-21-30	51									
						Dense light brown fine SAND with trace Shell fragments (SP)						
20		18-21-20	41									

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PAGE:	A-3

PROJECT: GEOTECNICAL EXPLORATION
ST. JOHNS RIVER STATE COLLEGE STUDENT SERVICES BUILDING ADDITION
ST. AUGUSTINE, FLORIDA

BORING DESIGNATION: **B-3** SHEET: **1 of 2**
SECTION: TOWNSHIP: RANGE:

CLIENT: AKEL, LOGAN AND SHAFER
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft): 3.5
DATE OF READING: 12/5/18
EST. W.S.W.T. (ft):

DATE STARTED: 12/5/18
DATE FINISHED: 12/5/18
DRILLED BY: S. TORRES
TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0			*15			Loose to medium dense dark brown slightly Silty fine SAND and trace Shell fragments (SP-SM)						
			*50									
			*55									
			*50				3.8	11.6				
			*60			Medium dense brown to light brown fine SAND (SP)						
			*60									
			*65	▼								
			*35									
			*5			Medium dense dark brown slightly Silty fine SAND with Roots (SP-SM)						
5												
		1-4-8	12			Medium dense to very loose dark brown fine SAND (SP)						
		7-5-7	12									
						Medium dense dark brown slightly Silty fine SAND (SP-SM) (Hardpan)						
		WOH-1-1	2			Very loose dark brown fine SAND (SP)						
10		WOH-3-10	13			Medium dense to dense light grayish-brown fine SAND with many Shell fragments (SP)						
15		10-20-24	44									
						Very dense light gray fine SAND with trace Shell fragments (SP)						
20		15-25-36	57									
						Dense light gray fine SAND with many Shell fragments (SP)						
25		18-21-20	41									

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BORING LOG

PROJECT NO.:	0930.1800265.0000
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PAGE:	A-4

PROJECT: GEOTECNICAL EXPLORATION
ST. JOHNS RIVER STATE COLLEGE STUDENT SERVICES BUILDING ADDITION
ST. AUGUSTINE, FLORIDA

BORING DESIGNATION: **B-3**
SECTION:
TOWNSHIP:
RANGE:
SHEET: **2 of 2**

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
25												
30	X	9-12-22	34									
						Dense to very dense gray fine SAND with trace Shell fragments (SP)						
35	X	12-18-21	39				3.8	27.0				
40	X	14-23-30	53									
						Medium dense to dense gray fine SAND with many Shell fragments (SP)						
45	X	7-10-20	30									
50	X	11-23-15	38									

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KEY TO BORING LOGS

SYMBOLS AND ABBREVIATIONS

SYMBOL	DESCRIPTION
N-Value	No. of Blows of a 140-lb. Weight Falling 30 Inches Required to Drive a Standard Spoon 1 Foot
WOR	Weight of Drill Rods
WOH	Weight of Drill Rods and Hammer
	Sample from Auger Cuttings
	Standard Penetration Test Sample
	Thin-wall Shelby Tube Sample (Undisturbed Sampler Used)
RQD	Rock Quality Designation
	Stabilized Groundwater Level
	Seasonal High Groundwater Level (also referred to as the W.S.W.T.)
NE	Not Encountered
GNE	Groundwater Not Encountered
BT	Boring Terminated
-200 (%)	Fines Content or % Passing No. 200 Sieve
MC (%)	Moisture Content
LL	Liquid Limit (Atterberg Limits Test)
PI	Plasticity Index (Atterberg Limits Test)
NP	Non-Plastic (Atterberg Limits Test)
K	Coefficient of Permeability
Org. Cont.	Organic Content
G.S. Elevation	Ground Surface Elevation

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS More than 50% retained on the 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 and gravel-sand-silt mixtures
			GC	Clayey gravels and gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS 5% or less passing No. 200 sieve	SW**	Well-graded sands and gravelly sands, little or no fines
			SP**	Poorly graded sands and gravelly sands, little or no fines
		SANDS with 12% or more passing No. 200 sieve	SM**	Silty sands, sand-silt mixtures
			SC**	Clayey sands, sand-clay mixtures
FINE-GRAINED SIOLS 50% or more passes the 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, 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 diamicaceous fine sands or silts, elastic silts
			CH	Inorganic clays or clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
			PT	Peat, muck and other highly organic soils

*Based on the material passing the 3-inch (75 mm) sieve
** Use dual symbol (such as SP-SM and SP-SC) for soils with more than 5% but less than 12% passing the No. 200 sieve

RELATIVE DENSITY
(Sands and Gravels)
Very loose – Less than 4 Blow/Foot
Loose – 4 to 10 Blows/Foot
Medium Dense – 11 to 30 Blows/Foot
Dense – 31 to 50 Blows/Foot
Very Dense – More than 50 Blows/Foot

CONSISTENCY
(Silts and Clays)
Very Soft – Less than 2 Blows/Foot
Soft – 2 to 4 Blows/Foot
Firm – 5 to 8 Blows/Foot
Stiff – 9 to 15 Blows/Foot
Very Stiff – 16 to 30 Blows/Foot
Hard – More than 30 Blows/Foot

RELATIVE HARDNESS
(Limestone)
Soft – 100 Blows for more than 2 Inches
Hard – 100 Blows for less than 2 Inches

MODIFIERS

These modifiers Provide Our Estimate of the Amount of Minor Constituents (Silt or Clay Size Particles) in the Soil Sample
Trace – 5% or less
With Silt or With Clay – 6% to 11%
Silty or Clayey – 12% to 30%
Very Silty or Very Clayey – 31% to 50%

These Modifiers Provide Our Estimate of the Amount of Organic Components in the Soil Sample
Trace – Less than 3%
Few – 3% to 4%
Some – 5% to 8%
Many – Greater than 8%

These Modifiers Provide Our Estimate of the Amount of Other Components (Shell, Gravel, Etc.) in the Soil Sample
Trace – 5% or less
Few – 6% to 12%
Some – 13% to 30%
Many – 31% to 50%

FIELD EXPLORATION PROCEDURES

Standard Penetration Test Boring

The penetration boring was made in general accordance with the latest revision of ASTM D 1586, "Penetration Test and Split-Barrel Sampling of Soils". The boring was advanced by rotary drilling techniques using a circulating bentonite fluid for borehole flushing and stability. At 2 ½ to 5 foot intervals, the drilling tools were removed from the borehole and a split-barrel sampler inserted to the borehole bottom and driven 18 inches into the soil using a 140 pound hammer falling on the average 30 inches per hammer blow. The number of blows for the final 12 inches of penetration is termed the "penetration resistance, blow count, or N-value". This value is an index to several in-place geotechnical properties of the material tested, such as relative density and Young's Modulus.

After driving the sampler 18 inches (or less if in hard rock-like material), the sampler was retrieved from the borehole and representative samples of the material within the split-barrel were placed in glass jars and sealed. After completing the drilling operations, the samples for each boring were transported to our laboratory where they were examined by our engineer in order to verify the driller's field classification.

LABORATORY TESTING PROCEDURES

Natural Moisture Content

The water content of the sample tested was determined in general accordance with the latest revision of ASTM D 2216. The water content is defined as the ratio of "pore" or "free" water in a given mass of material to the mass of solid material particles.

Percent Fines Content

The percent fines or material passing the No. 200 mesh sieve of the sample tested was determined in general accordance with the latest revision of ASTM D 1140. The percent fines are the soil particles in the silt and clay size range.

APPENDIX B

IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL ENGINEERING REPORT

CONSTRAINTS AND RESTRICTIONS

Important Information about This

Geotechnical-Engineering Report

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

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

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

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

Read the Full Report

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

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

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

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

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

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

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

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

Most Geotechnical Findings Are Professional Opinions

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

A Report's Recommendations Are Not Final

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

A Geotechnical-Engineering Report Is Subject to Misinterpretation

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

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

Do Not Redraw the Engineer's Logs

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

Give Constructors a Complete Report and Guidance

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

Read Responsibility Provisions Closely

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

Environmental Concerns Are Not Covered

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

Obtain Professional Assistance To Deal with Mold

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

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

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

GEOTECHNICAL BUSINESS COUNCIL
of the Geoprofessional Business Association

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

CONSTRAINTS AND RESTRICTIONS

WARRANTY

Universal Engineering Sciences has prepared this report for our client for his exclusive use, in accordance with generally accepted soil and foundation engineering practices, and makes no other warranty either expressed or implied as to the professional advice provided in the report.

UNANTICIPATED SOIL CONDITIONS

The analysis and recommendations submitted in this report are based upon the data obtained from soil borings performed at the locations indicated on the Boring Location Plan. This report does not reflect any variations which may occur between these borings.

The nature and extent of variations between borings may not become known until excavation begins. If variations appear, we may have to re-evaluate our recommendations after performing on-site observations and noting the characteristics of any variations.

CHANGED CONDITIONS

We recommend that the specifications for the project require that the contractor immediately notify Universal Engineering Sciences, as well as the owner, when subsurface conditions are encountered that are different from those present in this report.

No claim by the contractor for any conditions differing from those anticipated in the plans, specifications, and those found in this report, should be allowed unless the contractor notifies the owner and Universal Engineering Sciences of such changed conditions. Further, we recommend that all foundation work and site improvements be observed by a representative of Universal Engineering Sciences to monitor field conditions and changes, to verify design assumptions and to evaluate and recommend any appropriate modifications to this report.

MISINTERPRETATION OF SOIL ENGINEERING REPORT

Universal Engineering Sciences is responsible for the conclusions and opinions contained within this report based upon the data relating only to the specific project and location discussed herein. If the conclusions or recommendations based upon the data presented are made by others, those conclusions or recommendations are not the responsibility of Universal Engineering Sciences.

CHANGED STRUCTURE OR LOCATION

This report was prepared in order to aid in the evaluation of this project and to assist the architect or engineer in the design of this project. If any changes in the design or location of the structure as outlined in this report are planned, or if any structures are included or added that are not discussed in the report, the conclusions and recommendations contained in this report shall not

be considered valid unless the changes are reviewed and the conclusions modified or approved by Universal Engineering Sciences.

USE OF REPORT BY BIDDERS

Bidders who are examining the report prior to submission of a bid are cautioned that this report was prepared as an aid to the designers of the project and it may affect actual construction operations.

Bidders are urged to make their own soil borings, test pits, test caissons or other investigations to determine those conditions that may affect construction operations. Universal Engineering Sciences cannot be responsible for any interpretations made from this report or the attached boring logs with regard to their adequacy in reflecting subsurface conditions which will affect construction operations.

STRATA CHANGES

Strata changes are indicated by a definite line on the boring logs which accompany this report. However, the actual change in the ground may be more gradual. Where changes occur between soil samples, the location of the change must necessarily be estimated using all available information and may not be shown at the exact depth.

OBSERVATIONS DURING DRILLING

Attempts are made to detect and/or identify occurrences during drilling and sampling, such as: water level, boulders, zones of lost circulation, relative ease or resistance to drilling progress, unusual sample recovery, variation of driving resistance, obstructions, etc.; however, lack of mention does not preclude their presence.

WATER LEVELS

Water level readings have been made in the drill holes during drilling and they indicate normally occurring conditions. Water levels may not have been stabilized at the last reading. This data has been reviewed and interpretations made in this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, tides, and other factors not evident at the time measurements were made and reported. Since the probability of such variations is anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based upon such assumptions of variations.

LOCATION OF BURIED OBJECTS

All users of this report are cautioned that there was no requirement for Universal Engineering Sciences to attempt to locate any man-made buried objects during the course of this exploration

and that no attempt was made by Universal Engineering Sciences to locate any such buried objects. Universal Engineering Sciences cannot be responsible for any buried man-made objects which are subsequently encountered during construction that are not discussed within the text of this report.

TIME

This report reflects the soil conditions at the time of investigation. If the report is not used in a reasonable amount of time, significant changes to the site may occur and additional reviews may be required.

SECTION 02 41 20 SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included as indicated on the drawings and elsewhere in these Specifications:
   1. Selective demolition and removal generally includes the following types of materials and systems:
      a. Masonry Assemblies
      b. Concrete slab and pavers
      c. Partitions
      d. Ceiling and flooring
      e. Doors – interior and exterior
      f. Windows
      g. Mechanical equipment
      h. Plumbing fixtures
      i. Lighting fixtures
      j. Electrical equipment

   2. Selective demolition and removal generally processes such as:
      a. Demolishing designated building equipment and fixtures.
      b. Demolishing designated construction.
      c. Cutting and alterations for completion of the Work.
      d. Removing designated items for reuse and Owner's retention.
      e. Protecting items designated to remain.
      f. Removing demolished materials.

   3. Protection of existing facilities, hardscape, and landscape, not shown on drawings or specified to be removed, and project controls including such requirements as safeguard of emergency egress, dust control.

   4. Disconnection of existing utilities.

B. Related Work Specified Elsewhere:
   1. Water service disconnections and mechanical modifications: Division 15 - Mechanical.
   2. Electrical modifications: Division 16 – Electrical.

C. The general provisions of the Contract, including General Conditions, Supplementary Conditions, and Special Conditions (if any) along with the General Requirements, apply to the work specified in this section.

D. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.02 SUBMITTALS

A. Demolition Schedule: Indicate overall schedule and interruptions required for utility and building services.
   1. Indicate demolition and removal sequence.
   2. Indicate location of items designated for reuse and Owner's retention.
   3. Indicate location and construction of temporary work.

B. Closeout:
   1. Project Record Documents: Accurately record actual locations of capped utilities, concealed utilities discovered during demolition and subsurface obstructions.

1.03 QUALITY ASSURANCE

A. Contractor Qualifications: Experience in demolition of comparable type and scope.

B. Conform to applicable local codes for demolition work, dust control, products requiring electrical disconnection and re-connection.

C. Contact St. Johns River State College immediately upon discovery of any hazardous or contaminated materials.

D. Obtain required permits from authorities having jurisdiction.
   1. Maintain one copy of each document on site.

1.04 DISPOSITION OF MATERIAL

A. All materials and equipment, specified or shown on drawings to be demolished or removed is vested in Contractor upon execution of contract except those items indicated to be turned over to SJRSC, or to be used in new work of this project.
   1. Remove and store materials and equipment specified or shown on drawings to be removed and used in new work of this project, in manner that will prevent damage; includes items such as doors and door hardware, light fixtures, salvaged brick.
   2. Columns and/or Walls effected by the Work (to have finishes removed-repaired-painted and Walls to be removed): Remove, store in manner that will prevent damage, and reinstall as directed by Architect: existing clocks, fire extinguishers, wall or column mounted mirrors, medical equipment, tack/bulletin boards, hand sanitizer; toilet room accessories if impacted, and may be reused in new ADA accessible stalls and Family Toilet Rm, (including hand sanitizer, paper towel dispenser, toilet paper dispenser, soap dispenser; Koala Baby diaper changer station); signs leading into room unaffected by the work and other miscellaneous furnishings and equipment; store and reinstall in location as directed by owner within the building.
   3. Remove and transport as directed materials and equipment specified or shown on drawings to be removed and turned over to Owner, in manner that will prevent damage.
   4. Remove all materials and equipment, specified or shown on drawings to be demolished or removed, and vested in Contractor from project site.

B. The Owner will not be responsible for condition, loss, or damage to such property as specified above after execution of contract.

1.05 SCHEDULING AND PROJECT CONDITIONS

A. Cooperate with Owner in scheduling noisy operations and waste removal that may impact Owners operation in adjoining spaces.
   1. Conduct demolition to minimize interference with adjacent and occupied building areas.

2. Cease operations immediately if structure appears to be in danger and notify Architect. Do not resume operations until directed.

B. Coordinate utility and building service interruptions with Owner.
1. Do not disable or disrupt building fire or life safety systems without three (3) days prior written notice to Owner.
2. Schedule tie-ins to existing systems to minimize disruption.
3. Coordinate Work to ensure fire alarms, smoke detectors, emergency lighting, exit signs and other safety systems remain in full operation in occupied areas.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.01 PREPARATION

A. Provide appropriate temporary signage for exit or building egress.

B. Do not close or obstruct building egress path.

C. Do not disable or disrupt building fire or life safety systems without prior written notice to Owner

D. Notify affected utility companies before starting work and comply with their requirements.

B. Mark location and termination of utilities.

C. Erect and maintain temporary barriers and security, including warning signs and lights, and similar measures, for protection of the public, Owner, and existing improvements indicated to remain.

D. Erect and maintain weatherproof closures for exterior openings.

F. Erect and maintain temporary partitions to prevent spread of dust, odors and noise to permit continued Owner occupancy as indicated on drawings.

G. Prevent movement of structure; provide temporary bracing and shoring required to ensure safety of existing structure such as Mezzanine.

3.02 SALVAGE REQUIREMENTS

A. Coordinate with Owner to identify building components and equipment required to be removed and delivered to Owner.
1. Tag components and equipment Owner designates for salvage.

B. Protect designated salvage items from demolition operations until items can be removed.

C. Carefully remove building components and equipment indicated to be re-used / salvaged.
   1. Disassemble as required to permit removal from building.
   2. Package small and loose parts to avoid loss.
   3. Mark equipment and packaged parts to permit identification and consolidation of components of each salvaged item.
   4. Prepare assembly instructions consistent with disassembled parts.
   5. Package assembly instructions in protective envelope and securely attach to each disassembled salvaged item.

I. Properly store items for re-use. Deliver applicable salvaged items to Owner; obtain signed receipt from Owner.

3.03 DEMOLITION

A. Debris Control:
   1. Remove rubbish and debris from site on regular basis acceptable to Owner.
   2. Do not allow accumulations inside or outside building.
   3. Store materials which cannot be removed regularly only in areas and quantities approved in advance.

B. Dust Control:
   1. Provide protection to check spread of dust to occupied portions of building.
   2. Take appropriate action to avoid creation of nuisance in surrounding areas.
   3. Do not use water for dust control.
   4. Comply with all dust regulations imposed by local air pollution agencies.

C. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.

D. Remove temporary Work.

3.03 SAFETY AND PROTECTION

A. Buildings:
   1. Protect all existing work that is to remain in place by temporary covers, shoring, bracing, and supports.
   2. Repair items of work to remain in place damaged during performance of work or replace with new as approved.
   3. Do not overload structural elements.
   4. Provide new supports or reinforcement for existing construction weakened by demolition or removal of work.

B. Weather Protection:
   1. Where removal of existing roofing or roof-mounted equipment is necessary to accomplish work, have materials and workmen ready to provide adequate and approved temporary covering of exposed areas.
   2. Attend temporary coverings as necessary to insure effectiveness and to prevent displacement.
   3. Protect building interior and all materials and equipment from weather at all times.

C. Personnel: Where pedestrian and driver safety is endangered in area of removal work, provide protection as required.

3.04 EXISTING FACILITIES TO BE REMOVED

A. Masonry Walls and finishes: Remove masonry walls and associated gypsum board assemblies to top of floor slab, bottom of structure, and inside face of columns unless specifically shown otherwise.

B. Walls and Partitions: Remove interior walls and partitions to top of floor slab unless specifically shown otherwise.

C. Ceilings: Remove ceilings or portions of ceilings as indicated on drawings; intent is to impact only minimally Toilet Room gyp bd ceilings. Existing fixtures and ceiling mounted devices indicated for reuse or to be turned over to the College, are to be tied up in place, transmitted to College, or secured in another approved manner and reinstalled as indicated on the drawings.

C. Concrete Slabs: Remove floor slab/sidewalk as shown or as required for utilities.

D. Utilities:
   1. Remove all existing utilities where shown on drawings and terminate in manner conforming to nationally recognized Code covering specific utility and at time satisfactory to Architect.
   2. Contact Architect should any existing utilities, structures, etc. be uncovered that are not shown on drawings for direction by Architect; utilities to be abandoned shall be terminated in accordance with drawings and associated sections of these Specifications or if not indicated in a manner conforming to nationally recognized code covering specific utility and at time satisfactory to Architect.

E. Other building materials, equipment, fixtures, identified within 1.01, A Work Included and 1.04 Disposition of Materials.

3.05 CLEAN-UP

A. Debris and rubbish: Remove and transport debris and rubbish in manner that will prevent spillage on streets or adjacent areas. Turn-over dump tickets to Owner.
   1. Clean-up spillage from streets and adjacent areas.
   2. Comply with Federal, state and local hauling disposal regulations.
   3. Do not burn materials on site.

B. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.

C. Remove temporary Work.

3.06 LIABILITY OF CONTRACTOR

A. The Contractor shall be liable of any and all damages to hardscape, landscape, facilities, property, which result from his performance. He shall, without cost to the Owner, restore to the original condition any areas and/or construction damaged, defaced, disturbed, or destroyed by him or his workers.

B. Protect and preserve the Owner harmless against damage and claims for damage resulting from these activities

End of Section

SECTION 02 41 19

SELECTIVE STRUCTURE DEMOLITION

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:
1. Demolishing designated building equipment and fixtures.
2. Demolishing designated construction.
3. Cutting and alterations for completion of the Work.
4. Removing designated items for reuse and Owner's retention.
5. Protecting items designated to remain.
6. Removing demolished materials.

1.2 SUBMITTALS

A. Section 01 33 00 – SUBMITTALS

B. Demolition Schedule: Indicate overall schedule and interruptions required for utility and building services.

C. Shop Drawings:
1. Indicate demolition and removal sequence.
2. Indicate location of items designated for reuse and Owner's retention.
3. Indicate location and construction of temporary work.

1.3 CLOSEOUT SUBMITTALS

A. Project Record Documents: Accurately record actual locations of capped utilities, concealed utilities discovered during demolition and subsurface obstructions.

B. Operation and Maintenance Data: Submit description of system, inspection data, and parts lists.

1.4 QUALITY ASSURANCE

A. Conform to applicable local codes for demolition work, dust control, products requiring electrical disconnection and re-connection.

B. Contact St. Johns River State College immediately upon discovery of any hazardous or contaminated materials.

C. Obtain required permits from authorities having jurisdiction.

D. Maintain one copy of each document on site.

1.5 PRE-INSTALLATION MEETING

A. Convene minimum of one week prior to commencing work of this section.

1.6 SEQUENCING

A. Owner will conduct salvage operations before demolition begins to remove materials Owner chooses to retain.

1.7 SCHEDULING

A. Schedule Work to coincide with new construction.

B. Cooperate with Owner in scheduling noisy operations and waste removal that may impact Owners operation in adjoining spaces.

C. Coordinate utility and building service interruptions with Owner.

1. Do not disable or disrupt building fire or life safety systems without three (3) days prior written notice to Owner.
2. Schedule tie-ins to existing systems to minimize disruption.
3. Coordinate Work to ensure fire sprinklers, fire alarms, smoke detectors, emergency lighting, exit signs and other safety systems remain in full operation in occupied areas.

1.8 PROJECT CONDITIONS

A. Conduct demolition to minimize interference with adjacent and occupied building areas.

B. Cease operations immediately if structure appears to be in danger and notify Architect. Do not resume operations until directed.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.1 PREPARATION

A. Notify affected utility companies before starting work and comply with their requirements.

B. Mark location and termination of utilities.

C. Erect and maintain temporary barriers and security, including warning signs and lights, and similar measures, for protection of the public, Owner, and existing improvements indicated to remain.

D. Layout cuts in post tensioned concrete elements to avoid cutting concrete within 12 inches of any stressing tendon. Notify Architect three (3) days in advance of cutting post-tensioned concrete.

E. Erect and maintain weatherproof closures for exterior openings.

F. Erect and maintain temporary partitions to prevent spread of dust, odors and noise to permit continued Owner occupancy.

G. Prevent movement of structure; provide temporary bracing and shoring required to ensure safety of existing structure.

H. Provide appropriate temporary signage for exit or building egress.

I. Do not close or obstruct building egress path.

J. Do not disable or disrupt building fire or life safety systems without prior written notice to Owner.

3.2 SALVAGE REQUIREMENTS

A. Coordinate with Owner to identify building components and equipment required to be removed and delivered to Owner.

B. Tag components and equipment Owner designates for salvage.

C. Protect designated salvage items from demolition operations until items can be removed.

D. Carefully remove building components and equipment indicated to be salvaged.

E. Disassemble as required to permit removal from building.

F. Package small and loose parts to avoid loss.

G. Mark equipment and packaged parts to permit identification and consolidation of components of each salvaged item.

H. Prepare assembly instructions consistent with disassembled parts. Package assembly instructions in protective envelope and securely attach to each disassembled salvaged item.

I. Deliver salvaged items to Owner. Obtain signed receipt from Owner.

3.3 DEMOLITION

A. Conduct demolition to minimize interference with adjacent and occupied building areas.

B. Maintain protected egress from access to adjacent existing buildings at all times.

C. Do not close or obstruct roadways sidewalks without permits.

D. Cease operations immediately when structure appears to be in danger and notify Architect.

E. Disconnect and remove designated utilities within demolition areas.

F. Cap and identify abandoned utilities at termination points when utility is not completely removed. Annotate Record Drawings indicating location and type of service for capped utilities remaining after demolition.

G. Demolish in orderly and careful manner. Protect existing improvements and supporting structural members.

H. Carefully remove building components indicated to be reused.
1. Disassemble components as required to permit removal.
2. Package small and loose parts to avoid loss.
3. Mark components and packaged parts to permit reinstallation.
4. Store components, protected from construction operations, until reinstalled.

I. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury material on site.

J. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.

K. Remove temporary Work.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design requirements, placement procedures, and finishes, for the following:

1. Footings.
2. Foundation walls.
3. Slabs-on-grade.
4. .
5. Building walls.

B. Related Sections:

1.	Earthwork	Section 02 30 00
2.	Masonry Grout	Section 04 05 00
3.	Joint Protection	Section 07 90 00
4.	Non-metallic Grout	Section 03 60 30

C. The general provisions of the Contract, including General Conditions, Supplementary Conditions, and Special Conditions (if any) along with the General Requirements, apply to the work specified in this section.

D. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this trade.

1.2 DEFINITIONS

A. SER: Structural Engineer of Record for this project.

B. Contractor: General Contractor. Also refers to Construction Manager when this form of construction is utilized on the project.

C. Sub-contractor: Provides materials or services for the project through the Contractor.

D. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

E. Delegated Engineer: Also referred to as Specialty Engineer, is a Florida professional engineer who undertakes a specialty service and provides services or creative work (delegated engineering document) regarding a portion of the engineering project. The delegated engineer is the engineer of record for that portion of the engineering project. Refer to Chapter 61G15-30 Responsibility Rules Common to All Engineers, Board of Professional Engineers, Florida Administrative Code, for additional information.

1.3 ACTION SUBMITTALS

A. General:

1. Submit all documents and samples in conformance to Specification Section 01 33 00.
2. Computer drawing files are available for use in the production of shop drawings if allowed by the Architect. Requirements include disclaimer and contract provided by the Engineer and payment for files by the requesting sub-contractor.
3. Electronic submittals are required and printed copies are not acceptable unless specifically allowed by contract with the Owner.
4. Review of shop drawings does not constitute authorization to vary from the contract documents.
5. Submittal Scheduling: The Contractor shall be responsible for scheduling submittals with ample time allotted for the review process and possible resubmittals.

B. Design Mixtures: For each concrete mixture, per ASTM C-192. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Steel Reinforcement Shop Drawings:

1. Submit shop drawings for fabrication and placement of all reinforcing. Include bar schedules, stirrup spacing, arrangement and concrete cover. Provide full information for placing without reference to design drawings. Indicate walls in elevation at a scale of not less than ¼" = 1'0". Indicate openings which interrupt reinforcing, including special reinforcing. Coordinate openings with HVAC, electrical and plumbing contractors. Show all areas fully. Do not use "similar" or "opposite hand" notations.

    a. Electronic submittal is required and file format utilizing PDF format is preferred.
    b. All placing work must be checked against the contract drawings. All drawings and details shall be checked by Contractor and show Contractor's approval and the initials of the checker before they are submitted to Architect and SER for review. If required dimensions or necessary details are not clearly shown on the contract drawings, Contractor shall circle and question them on the working plans. These dimensions and details will be checked or furnished by the Architect.
    c. Drawings shall be clearly marked "FOR APPROVAL ONLY – NOT FOR FIELD USE". If drawings are not approved but are returned for corrections, the approval copies shall be resubmitted. After initial review has been made, final drawings shall be resubmitted, with all corrections made, for final review, stamped "FOR FIELD USE".

D. Product Data: For each type of product indicated.

E. Manufacturer's Data: For information only, submit manufacturer's data with application and installation instructions for all proprietary materials and items relative to the concrete work.

F. Advance Mix Design:

1. Comply with ASTM C-192; each class of concrete required for the job shall be designed by the Contractor's independent engineering testing laboratory or supplier to determine the proper proportions of ingredients to insure concrete of the desired strength, workability and durability.
2. The maximum permissible water cement ratio, based on a five inch (5") slump, shall be maximum 0.50 unless noted otherwise, and shall produce a laboratory strength at least fifteen percent (15%) greater than the strengths specified.
3. Advance mix designs shall be submitted for review far enough in advance (at least 14 days) of the placing of concrete in order not to create delays in the work. Mix designs shall be prepared in accordance with latest version of ACI 318 "Building Code

Requirements for Reinforced Concrete", Section 5.3, field experience method or trial batches.

4. Regardless of the recommendations of the testing laboratory or supplier, it shall be the responsibility of the Contractor to furnish the strength and quality of concrete specified.
5. Test results will be reported to the Architect, Engineer, Contractor, Concrete Producer, and other firms listed on the distribution list on the same day that the tests are performed. All test reports indicating non-compliance should be e-mailed or faxed immediately to all parties on the test report distribution list.
6. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

G. Formwork Shop Drawings: Contractor shall erect and remove all forms and shores. Forms and shores shall be designed to safely carry their own weight plus all superimposed dead, wind, lateral construction loads, and not less than fifty (50) pounds per square foot live load. Applicable codes and standards, including ACI 347, exceeding these requirements shall also be met.

1. All specialty formwork design shall be prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork. Shop drawings shall be signed and sealed by an Engineer registered in the State of Florida.
2. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.

H. Reports:

1. Report test results to Architect and SER immediately after tests are made.
2. Report tests of materials and advance concrete mix designs before job concrete work is started.
3. Reports of compressive strength tests shall contain the cylinder set number, project identification name and number, date of concrete placement, name of Contractor, name of supplier, truck number, name of testing service, concrete type and class, concrete mix number, location of concrete batch in structure, design compressive strengths at 28 days, compressive breaking strength, type of break for both 7 day and 28 day tests, entrained air content, slump, air temperature, weather, and any water added after leaving the plant.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Slab-on-grade Installer.

B. Welding certificates.

C. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Curing compounds.
6. Floor and slab treatments.
7. Bonding agents.
8. Adhesives.
9. Vapor retarders.
10. Semi-rigid joint filler.
11. Joint-filler strips.
12. Repair materials.

D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates.

E. Field quality-control reports.

F. Minutes of pre-installation conference.

1.5 QUALITY ASSURANCE

A. Applicable Codes, Specifications, and Standards: Comply with provisions of the following codes, specifications and standards, except where more stringent requirements are shown or specified. All codes, specifications and standards referred to shall be latest editions:

1. American Concrete Institute (ACI):

a.	ACI 117	Tolerances for Concrete Construction
b.	ACI 211.1	Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete
c.	ACI 211.4	Recommended Practice for Evaluation of Strength Test Results of Concrete
d.	ACI 301	Structural Concrete for Buildings
e.	ACI 302	Recommended Practice for Concrete Floor and Slab Construction
f.	ACI 304	Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
g.	ACI 305	Hot Weather Concreting
h.	ACI 306	Cold Weather Concreting
i.	ACI 308	Recommended Practice for Curing Concrete
j.	ACI 309	Recommended Practice for Consolidating Concrete
k.	ACI 315	Detailing Manual
l.	ACI 318	Building Code Requirements for Reinforced Concrete
m.	ACI 347	Concrete Formwork

2. Concrete Reinforcing Steel Institute (CRSI): Manual of Standard Practice
3. American Society for Testing Materials (ASTM): All ASTM standards shall apply where appropriate.

4. American Welding Society (AWS):

a.	AWS-D1.1	Structural Welding Code
b.	AWS-D1.4	Structural Welding Code-Reinforcing Steel

5. American Institute of Steel Construction (AISC): Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

B. Workmanship: Contractor shall furnish a full time qualified foreman to oversee and direct the construction of all formwork, reinforcing steel placement and concrete placing. Contractor shall correct work which does not conform to specified requirements, including strength, tolerances and finish. Deficiencies shall be corrected as directed by Architect and as specified herein, at the Contractor's expense.

C. Installer Qualifications: A qualified installer who employs on this Project, personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

D. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

E. Testing Agency Qualifications: An independent agency, acceptable to the Architect and SER, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

F. Concrete Testing Service:

1. The Contractor shall employ, at his expense, a qualified Independent Engineering Testing Laboratory, approved by Architect and Engineer, to perform material evaluation tests, and to design the concrete mixes, and to perform quality control testing during construction, as specified.
2. Materials and installed work may require testing and retesting, as directed by Architect, at any time during the progress of the work. Allow free access to material stockpiles and facilities at all times.
3. When retesting of rejected materials or installed work is required, Contractor pays for tests. When retesting of installed work is required by the Architect due to negligence or improper construction practices by the Contractor, or low test results of Contractor installed work, the Contractor will be responsible for all costs pertaining to determination of acceptability of the work.
4. Material Sources: Sources of materials must remain unchanged during the course of the work; any variation of materials will require retesting. Certificates of material properties and compliance with specified requirements may be submitted in lieu of testing, when acceptable to the Architect, provided the proposed materials have a satisfactory service record and have been tested within the past year and such previous tests have met the specified requirements. Certificates of compliance for each material must be signed by the Contractor and the supplier.

G. Quality Control Tests During Construction: Concrete shall be sampled and tested for adequacy of design for strength, as a basis for acceptance of the concrete and for shore removal. Test cylinders shall be made, stored and tested by the testing laboratory. Protect test cylinders while stored on the site. Handle and store carefully prior to testing. Concrete shall be sampled and tested as follows:

1. Sampling and Field Concrete: ASTM C-172; except modified for slump to comply with ASTM C-94.
2. Slump: ASTM C-143; one test for each concrete load at point of placement in the structure and one for each set of compression strength test specimens.
3. Air Content: ASTM C-231, pressure method or ASTM C-174, volumetric method. Use volumetric method for lightweight concrete. Air content tests must be made each time compressive test specimens are molded from concrete required to be entrained.
4. Acceptance Test Specimens: ASTM C-31; one set of 4 standard test cylinders for each compression strength test. Mold and store for laboratory cured test specimens.
5. Field Stored Test Specimens: ASTM C-31; one set of three standard test cylinders of all shored areas, for each compression strength test made. Store in protected location on

job site, under the same conditions as concrete from which cylinders were taken, until tests are required.

6. Compressive Strength Tests:

   a. Comply with ASTM C-39 and ASTM C-31; one set of 4 cylinders (minimum) for each 50 cubic yards or fraction thereof, for each class of concrete placed in any one day or for each 4000 sq. ft. of surface area placed, whichever is less.
      1) Every arithmetic average of any consecutive three tests shall equal or exceed f'c and
      2) No individual strength test (average of two cylinders) shall be less than f'c by more than 500 psi.
   b. For acceptance tests, break 1 cylinder at 7 days for information and 2 at 28 days for acceptance, with 1 cylinder held in reserve.
   c. Field stored cylinders shall be taken in same manner as acceptance cylinders, except they shall be taken only from those portions of the structure which are shored or braced or as noted. To check items for removing shores, break one cylinder at a time until required strength is reached.
   d. When the strength of field stored cylinders is less than 85% of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing in-place concrete.

7. Tests of In-Place Concrete:

   a. Testing service shall make additional tests of in-place concrete when results indicate to the Architect that specified concrete strengths or other characteristics have not been met.
   b. Tests may consist of cored cylinders complying with ASTM C-42, or if these tests are not conclusive, by load test performed in accordance with Chapter 20 of ACI Standard 318-05.
   c. These tests shall be paid for by the Contractor.

H. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

I. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code - Reinforcing Steel."

J. Pre-installation Conference: Conduct conference at Project site

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

   a. Contractor's superintendent.
   b. Independent testing agency responsible for concrete testing.
   c. Ready-mix concrete manufacturer.
   d. Concrete subcontractor.
   e. Threshold Inspector

2. Review inspection and testing agency procedures for field quality control, concrete finishes and finishing, cold-weather and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi-rigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel

reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Exposed Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.

a. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows: B-B Plyform (Concrete Form), Class 1 Exterior Type – Douglas Fir Plywood Association or better; mill oiled and edge sealed.

B. Unexposed Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation. Coordinate with Architectural requirements.

D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, or as shown on the drawings.

E. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal. Refer to drawings for details.

F. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

G. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive damp proofing or waterproofing.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars:

1. ASTM A 615, Grade 60 (minimum).
2. 95% (minimum) recycled steel content.
3. Produced within 500 miles of the project.

B. Plain-Steel Welded Wire Reinforcement:

1. ASTM A 185 Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
2. Provide 6x6 – W1.4xW1.4 WWF (min.) unless otherwise indicated.
3. 95% (minimum) recycled steel content.
4. Produced within 500 miles of the project.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars:

1. ASTM A 615.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. Size and spacing sufficient to hold and support in position all reinforcing during construction and placing of concrete, but not less than the recommendations of ACI-315 and CRSI Manuals of Standard Practice Class C & D.
2. Bar supports resting on wooden forms shall have upturned legs. All supports for reinforcing shall be adequate to hold reinforcing in place during construction and during placing of concrete.
3. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 all-plastic bar supports or CRSI Class 2 stainless-steel bar supports.
4. Support foundation reinforcing on concrete support blocks as detailed on the drawings.
5. Reinforcing for slabs on grade shall be maintained in the specified locations within the slab or approved support blocks or chairs shall be used.

C. Dovetail Slots: Refer to Section 04 20 00 Masonry Assemblies. Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I or Type III, gray. May be Supplemented with the following:

a. Fly Ash: ASTM C 618, Class F. Fly ash (ASTM C-618, Type F) may be used in quantities up to 25% of cement content by weight.

b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120. Replacement of a portion of Type I cement with ground iron blast-furnace slag ASTM C989 shall be limited to 50% by weight.
c. Silica Fume: ASTM C 1240, amorphous silica. Replacement of a portion of Type I cement with Silica/Fume, AASHTO M307, shall be limited to 25% by weight.

B. Normal-Weight Aggregates:

1. Maximum Coarse-Aggregate Size: Crushed stone, rock or gravel meeting requirements of ASTM C-33 and graded in accordance with Table 2 size No. 57 (max.). All aggregate for exposed concrete shall be from the same source.
2. Fine Aggregate: Clean, sharp silica or quartz sand meeting all requirements of ASTM C-33 and having a fineness modulus between 2.25 and 3.0. Free of materials with deleterious reactivity to alkali in cement.
3. Aggregate shall be free of soft or friable particles, be free of unfavorable capillary absorption characteristics and shall not produce weather stains

C. Water: ASTM C 94 and potable, free from acid, oil or other injurious matter.

2.5 ADMIXTURES

A. General Requirements:

1. When any specified admixture is used in the concrete, the compressive strength, bond strength and flexural strength shall not be less than that of the specified concrete strengths without admixtures.
2. All admixtures used in a mix design shall be compatible with each other.
3. Volume change of concrete shall not be more with admixtures than without admixtures.
4. No concrete ingredient shall contain more than 0.05% chloride ions or the amount present in municipal drinking water, whichever is less.
5. Written conformance to above mentioned requirements and the chloride ion content will be required from the admixture manufacturer prior to mix design review by the SER.

B. Air-Entraining Admixture: ASTM C 260.

C. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494, Type A.
2. Retarding Admixture: ASTM C 494, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
4. High-Range, Water-Reducing Admixture (Superplasticizer): ASTM C 494, Type F.
5. High-Range, Water-Reducing and Retarding Admixture (Superplasticizer): ASTM C 494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

D. Calcium Chloride: Calcium chloride is **not** permitted.

E. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494, Type C.

F. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

2.6 VAPOR RETARDERS

A. Sheet Vapor Retarder: 15 mil minimum, ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Products: Subject to compliance with requirements, provide the following or equal approved by the SER or the Architect prior to bidding:

   a. Stego Industries, LLC; Stego Wrap 15 mil Class A.

2. Install vapor retarder directly under all interior slabs-on-grade. Following leveling and tamping of granular base for slabs on grade, place vapor retarder sheeting with the longest dimension parallel with direction of pour. Joints shall be lapped at least 6 inches and sealed with a completely continuous pressure sensitive tape. Just prior to the pouring of the concrete, the vapor retarder shall be checked for punctures. All holes shall be covered with strips of the same material lapping holes 6 inches on all sides. Vapor retarder installation must be reviewed prior to concrete placement.

2.7 LIQUID FLOOR TREATMENTS

A. VOC Content: Liquid floor treatments shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

2.8 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

G. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.9 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

D. Reglets: Fabricate reglets of not less than 0.022-inch- thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

E. Post-Installed anchors and anchoring systems: Refer to the General Structural Notes on the construction drawings.

F. Non-Shrink Grout:

1. Refer to Specification 03 60 30.
2. Steel base and bearing plates: Refer to Specification 05 12 00.

2.10 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C 109.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.

4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109.

C. FLOOR PATCHING RESURFACER

1. Military Spec. MIL-D-3135. Fed. Spec. SS-C-1302. Latex or acrylic epoxy type.

2.11 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Proportions: All concrete shall be accurately proportioned by weight so as to give an ultimate compressive strength at 28 days, or at a time of use, as called for on the structural drawings. The proportions of materials shall be such as to produce concrete that can be readily puddled into the corners and angles of the forms and around the reinforcement without segregation or undue accumulation of water or laitance on the surface. Water/cementitious ratio shall be held to the minimum consistent with proper placing and finishing. The amount of mixing water used shall take into account the moisture, or lack of the same, in the aggregate and liquid admixtures used.

C. Cementitious Materials Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.
3. Ground Granulated Blast-Furnace Slag: 50 percent.
4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
5. Silica Fume: 25 percent.

D. Limit water-soluble, chloride-ion content in hardened concrete to that present in the local Municipal water supply.

E. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete and concrete with a water-cementitious materials ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.55.
3. Minimum Cementitious Materials Content: 470 lb/cu. yd.
4. Maximum Aggregate Size: 1”.
5. Slump Range: 3 inches to 6 inches.

B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3500 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.50.
3. Minimum Cementitious Materials Content: 500 lb/cu. yd.
4. Maximum Aggregate Size: 3/4”.
5. Slump Range: 2 inches to 4 inches.
6.

C. Building Frame Members: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Minimum Cementitious Materials Content: 520 lb/cu. yd.
4. Maximum Aggregate Size: 3/4”.
5. Slump Range: 3 inches to 5 inches.

2.13 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information. A competent foreman shall be in charge of concrete mixing at all times.

B. Mixers shall be in first class working order. Mixer blades shall not have their height reduced by more than one inch. Blades showing more wear than this shall be replaced or the mixer shall not be used.

C. Mixers shall be equipped with accurate and dependable water measuring devices.

D. When air temperature is between 85 and 90 degrees F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.

E. Concrete Temperature

1. When concrete temperature is below 85 degrees when the mixer (truck) arrives on site, the total maximum time that concrete may be placed from the truck from the time of batching is 90 minutes.
2. When concrete is between 85 and 90 degrees when the mixer (truck) arrives on site, the total maximum time that concrete may be placed from the truck from the time of batching is 75 minutes.
3. When concrete is between 90 and 95 degrees when the mixer (truck) arrives on site, the total maximum time that concrete may be placed from the truck from the time of batching is 60 minutes. In this case, the following conditions must be monitored:

    a. Temperature of the concrete shall be monitored with a properly calibrated thermometer. Should the temperature during placement exceed 95 degrees, the placement of concrete from the truck shall cease.

4. When concrete temperature is greater than 95 degrees when the truck arrives on site, the truck shall be rejected and may not return to the site during the current product placement.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.
2. Class B, 1/4 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

F. Chamfer exterior corners and edges of permanently exposed concrete, unless noted otherwise.

1. Exposed corners of beams, columns and walls shall be chamfered with 3/4” x 3/4”, or size shown on Drawings, wood strip or PVC manufactured plastic strips. Accurately form surface to product uniformly straight lines and tight edge joints. Miter joints at changes in direction and where terminated in an exposed condition.

2. Where masonry or other framing or finish material butts flush to columns, beams or walls, corners shall be square or as noted on the drawings.

H. Form openings, chases, offsets, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

I. Provision for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Size and location of openings, recesses and chases are the responsibility of the trade requiring such items. Accurately place and securely support items to be built into the forms.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges" as noted below:

   a. Anchor bolts and foundation bolts are set by the owner (contractor) in accordance with an approved drawing. They must not vary from the dimensions shown on the erection drawings by more than the following:
      1) 1/8-inch center to center of any two bolts within an anchor bolt group, where an anchor bolt group is defined as the set of anchor bolts which receive a single fabricated steel shipping piece.
      2) 1/4-inch center to center of adjacent anchor bolt groups.
      3) Elevation of the top of anchor bolts ± 1/2-inch.
      4) Maximum accumulation of 1/4-inch per hundred feet along the established column line of multiple anchor bolt groups, but not to exceed a total of 1 inch, where the established column line is the actual field line most representative of the centers of the as-built anchor bolt groups along a line of columns.
      5) 1/4-inch from the center of any anchor bolt group to the established column line through that group.
      6) The tolerances of paragraphs 2, 3, and 4 apply to offset dimensions shown on the plans, measured parallel and perpendicular to the nearest established column line for individual columns shown on the plans to be offset from established column lines.

   b. Unless shown otherwise, anchor bolts are set perpendicular to the theoretical bearing surface.

2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures where masonry abuts structure and as indicated.
4. Set and build into the work: anchorage devices, steel angles and plates, dovetail anchor slots, ceiling inserts and other embedded items required for work that is attached to, or supported by, cast-in-place concrete.
5. Use setting drawings, diagrams, instructions and directions provided by the supplier of the items attached thereto and to other sections of these specifications.
6. Protect all embedded items that must be set by others.
7. Set all bolts, anchors, grounds and inserts as required.

8. Where structural steel shapes and other members are shown bolted to the concrete, bolts shall be set in proper position in the forms before the concrete is placed and space as indicated on the drawings.
9. Bolts and nuts exposed to moisture conditions shall be galvanized.
10. Conduit: Conduit may be placed in slabs 4-1/2” or more in thickness provided conduit or layers or conduit fall completely within the middle 1/3 of the slab depth and are spaced not closer than 24” o.c. No conduit in slabs shall be more than 1” in diameter. No pipe or conduit shall interfere with the placing or functioning of the reinforcing and it shall be rigidly held in the specified positions.
11. Conduit shall not be placed within slabs in composite slab construction or in concrete placed on steel form deck – typical.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

1. ACI 301 and ACI 347 require concrete to reach its specified compressive strength.
2. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 75 percent of its 28-day design compressive strength.
3. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
4. When completed, all forms shall be completely removed and all form ties shall be broken back or pushed out and filled as specified.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

D. Apply new form coating compound material to concrete contact form surfaces as specified for new formwork.

3.4 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape or sealant.

3.5 STEEL REINFORCEMENT

A. General: Contractor shall be responsible for the placing and functioning of the reinforcement. Comply with the codes and standards specified, and the Concrete Reinforcing Steel Institute’s recommended practice for “Placing Reinforcing Bars”, for details and methods of reinforcement placing and supports, and as herein specified.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Cleaning: Reinforcing shall be free of loose scale, flaking, rust, oil, mud or other foreign matter when placed in the forms and when concrete is placed. Where any spilled concrete has dried on the steel, it shall be thoroughly cleaned before additional concrete is placed.

C. Bending:

1. Reinforcement shall be of correct length and size and accurately bent in accordance with contract drawings.
2. All bars shall be shop fabricated and shall be bent cold.
3. Unless otherwise specifically noted, “recommended” hooks and bends as per ACI 315 shall be used. Slant hooks as required to maintain specified clearances – do not cut hook tails.
4. Bars which are straight except for hooks are scheduled as straight bars.
5. Where lengths of bars are called for on the drawings, they are exclusive of hooks.

D. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4, only where indicated.

E. Set wire ties (18 gauge wire minimum) with ends directed into concrete, not toward exposed concrete surfaces.

F. Splicing: No splicing of main reinforcing steel will be permitted unless specifically shown on the drawings. Bars marked continuous shall be lapped forty (40) diameters (minimum) at splices and at corner conditions where corner bars shall be provided. Wire mesh shall be lapped six inches minimum and shall be wired together.

G. Protection of Reinforcing: As indicated on drawings.

H. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing plus 2”. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

I. Tolerances: Minimum concrete cover for reinforcing indicated on drawings must be maintained. Tolerances for location of reinforcing shall fall within the limits listed below:

1. Cover on bottom bars…….±1/4 inch
2. Lengthwise positioning of bars……..±1 inch
3. Spacing of bars in walls, slabs and footings……...±1 inch
4. Spacing of bars in beams…….-1/4 inch
5. Cover on top bars……+1/4 inch
6. Stirrup spacing:
   For one stirrup……..-1/2 inch
   Overall group of stirrups ……+2 inches

3.6 JOINTS

A. General:

1. Construct joints true to line with faces perpendicular to surface plane of concrete.
2. Except as otherwise indicated on drawings, the work shall be planned to provide a minimum number of construction joints consistent with good placing practices.
3. Location of joints not indicated must be approved by Architect.
4. Columns shall be placed continuously to an even level of the bottoms of connecting beams.
5. Give particular attention to cleaning of laitance from top of vertical members and to cleaning of concrete from projecting reinforcing.
6. Reinforcing shall run continuous through construction joints.
7. Provide 1-1/2” deep keyways between walls and beams and walls and footings.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction (Control) Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide gap ¼ of the slab depth joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 07 900 "Sealants," are indicated.

E. Expansion joints: Construct expansion joints where indicated on drawings and in slabs to form patterns of panels as indicated on drawings.

3.7 CONCRETE PLACEMENT

A. General:

1. Comply with ACI 304, and as herein specified.
2. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, provide construction joints as specified.
3. Deposit concrete as nearly as practicable to its final location to avoid segregation due to rehandling or flowing.
4. Clean all dowels of concrete before placing new concrete.
5. Do not place concrete in standing water nor in rainy weather.

B. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleed water appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1.

G. Hot-Weather Placement: Comply with ACI 305.

H. Pre-Placement Inspection:

1. Before placing concrete, inspect and complete the formwork installation, reinforcing steel, and items to be imbedded or cast-in.
2. Notify other crafts to permit the installation of their work; cooperate with other trades in setting such work, as required.

3. Coordinate the installation of joint materials and moisture retarders with placement of forms and reinforcing steel.
4. Before placing concrete for slab on grade, all piping and other utilities under slab shall have been inspected and tested and all excavations back-filled and properly compacted and tested to the specified modified proctor (95% minimum).
5. Completely clean forms of all debris, sawdust, dirt, etc. prior to concrete placement.
6. Thoroughly wet wood forms, earth, and masonry, immediately before placing concrete where forms coatings are not used.
7. Notify Architect and Engineer of placing schedule at least 48 hours in advance.

I. Placing Concrete in Forms:

1. Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid cold joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
2. Remove temporary spreaders in forms when concrete placing has reached the elevation of such spreaders.
3. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use vibrators designed to operate with vibratory element submerged in concrete, maintaining a speed of not less than 10,000 impulses per minute. Have available for use at least two vibrators, in case of breakdown, for each concrete placing crew. Use equipment and procedures for consolidation of concrete in accordance with the recommended practices of ACI 309, to suit the type of concrete and project conditions. Vibration of forms and reinforcing will not be permitted, unless expressly accepted by the Engineer. Do not use vibrators to transport concrete inside of forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate the placed layer of concrete and at least 6 inches into the preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit the duration of vibration to the time necessary to consolidate the concrete and complete embedment of reinforcement and other embedded items without causing segregation of the mix.
4. Do not place concrete on supporting elements until the concrete previously placed in columns and walls is no longer plastic. (2 hrs. min.)

J. Placing Horizontal Concrete Work:

1. Maintain reinforcing in the proper position during concrete placement operations.
2. Deposit and consolidate concrete in a continuous operation, within the limits of construction joints, until the placing of a panel or section is completed.
3. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners. Consolidate concrete in slabs by vibrating bridge screeds, roller pipe screeds, or other acceptable methods. Limit the time of vibrating consolidation to prevent bringing an excess of fine aggregate to the surface.
4. Bring slab surfaces to the correct level with a straightedge and strikeoff. Use bull floats or darbies to smooth the surface, leaving it free of humps or hollows. Do not sprinkle water or cement on the plastic surface. Do not disturb the slab surfaces prior to beginning finishing operations. Maintain reinforcing in the proper position during concrete placement operations.

3.8 BONDING

A. General: Roughen surfaces of set concrete at all joints, except where bonding is obtained by use of a concrete bonding agent, and clean surfaces of laitance, coatings, loose particles and

foreign matter. Roughen surfaces in a manner to expose bonded aggregate, or remove damaged concrete at the surface.

B. New to Hardened Fresh Concrete: Dampen but do not saturate the roughened and cleaned surface of set concrete and apply a coat of neat cement grout composed of equal parts of Portland Cement and fine aggregate by weight with not more than 6 gallons of water per sack of cement. Apply with a stiff broom or brush to a minimum thickness of 1/16". Deposit fresh concrete before cement grout has attained its initial set. In lieu of neat cement grout, surface in accordance with manufacturer's printed instructions. Acceptable: Euclid "Euco Weld"; Larsen "Weldcrete".

3.9 FINISHING FORMED SURFACES

A. General: Immediately after removing forms, inspect concrete for honeycombs, voids, fins, stone pockets, and other imperfections. Remove fins and other unintended projections; properly fill and patch all imperfections.

B. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched.

1. Apply to concrete surfaces not exposed to public view.
2. After patching is completed, sack grout to fill all air and bubble holes.

C. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, to be covered with a coating or covering material applied directly to concrete

D. Rubbed Finish: Unless specifically noted otherwise, provide all concrete surfaces with a smooth rubbed finish, uniform in color and texture. Apply the following to smooth-formed finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.

1. Apply scratch finish to surfaces indicated and to receive concrete floor toppings and to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated to receive trowel finish and to surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
2. After screeding and consolidating concrete slabs, do not work surface until ready for floating.
3. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven or hand floating if area is small or inaccessible to power units.
4. Check and level surface plane to a tolerance not exceeding 1/4” in 10 feet when tested with a 10 foot straightedge. Cut down high spots and fill low spots.
5. Uniformly slope surface to drains.
6. Immediately after leveling, refloat surface to a uniform, smooth texture.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
2. After floating, make first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Surface shall be toweled at least two additional times to produce a dense surface free of trowel marks and uniform in texture and appearance.
3. For all slab-on-grade, finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch.
4. Grind smooth surface defects which would telegraph trough applied floor covering system.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
2. Coordinate required final finish with Architect before application.

F. Non-Slip Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Architect before application.

G. Slip-Resistive Finish: For exposed slabs, provide a non-slip surface utilizing a light broom finish.

H. Chemical-Hardener Finish: Apply chemical-hardener finish to all exposed interior concrete floors and exterior covered walks, including topping slabs, not scheduled to receive other finishes.

1. Coordinate required final finish with Architect before application.
2. Apply liquid chemical-hardener after complete curing and drying of the concrete surface.
3. Apply proprietary chemical hardeners in accordance with manufacturer's printed instructions.
4. After final coat of chemical-hardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water.

3.11 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded, unless otherwise indicated on the drawings.

C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 4 inches high unless otherwise indicated; and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for equipment anchor support.
3. Minimum Compressive Strength: 3500 psi at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, unless otherwise indicated, install galvanized anchor bolts that extend through concrete base, and anchor into structural concrete substrate.
6. Prior to placing concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

1. Minimum concrete strength: 3000 psi at 28 days.

3.12 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305 for hot-weather protection during curing.

1. Protect freshly placed concrete from premature drying, excessive cold or hot temperature, rain and mechanical injury.
2. Maintain without drying at a relatively constant temperature for a period of time necessary for hydration of cement and proper hardening. Start initial curing as soon as free water

has disappeared from concrete surface after placing and finishing of slabs and as soon as forms are removed from formed surfaces. Keep slabs and other exposed fresh concrete continuously moist for not less than 7 days. Begin final curing procedures immediately following initial curing and before concrete has dried.

3. Where mechanical trades set up work areas within the building, protect concrete slabs from oil, grease and other injurious materials by substantial covering of Kraft paper or polyethylene sheeting
4. Cold Weather Concreting: Concrete shall not be placed during period when the air temperature is at or below 40ºF or whenever it appears to the Architect, from weather reports or otherwise, that air temperature may fall below 40ºF within the twenty-four (24) hour period next following the completion of a concrete placement without taking approved precautions. Contractor shall take approved precautions to maintain the temperature of the concrete at no less than 70ºF for three (3) days or 50ºF for five (5) days after placement. For approved procedures see ACI 306 “Recommended Practice for Cold Weather Concreting”.
5. Hot Weather Concreting: During hot weather use all available means to keep concrete temperature as low as practical, but in no case shall temperature of concrete at time of placement be higher than 90ºF. At air temperature above 80ºF, use retarding admixture. For approved procedures see ACI 305 “Recommended Practice for Hot Weather Concreting”.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods and as required for the finishes to be applied to the surface:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on the Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

F. Non-Oxidizing Metallic Hardener: All slabs, in the loading dock area and other areas noted on the drawings, shall receive an application of the non-oxidizing, metallic floor hardener applied per the manufacturer’s recommendations. The surface shall then be troweled, at least twice, to a smooth dense finish. Cure slab surface with curing compound recommended by hardener manufacturer. Apply curing compound immediately after final finishing.

G. Mineral Aggregate Hardener: All slabs in areas noted on the drawings, shall receive an application of the mineral aggregate hardener applied per the manufacturer’s recommendations. The surface shall be floated again to properly bond the hardener to the base concrete slab. The surface shall then be troweled, at least twice, to a smooth, dense finish.

3.13 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply to concrete that is less than 28 days' old.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.14 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least three month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template. All repairs shall be made using project approved materials.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around the reinforcing. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to SER and Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to SER and Architect's approval.

3.16 FIELD QUALITY CONTROL

A. Testing: Contractor will engage a qualified testing agency to perform field tests and prepare test reports.

B. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's placement of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. Slump: ASTM C 143 one test at point of placement for each composite sample, but not less than one test for each day's placement of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Concrete Temperature: ASTM C 1064 one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
4. Compression Test Specimens: ASTM C 31.

    a. Cast and laboratory cure two sets of four standard (6” x 12”) cylinder specimens for each composite sample. Cast five specimens when using 4” x 8” cylinders.
    b. Cast and field cure a minimum of two sets of two additional standard cylinder specimens for each composite sample for all shored concrete members.

5. Compressive-Strength Tests: ASTM C 39 test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

    a. Test one field-cured specimen at 7 days and one set of two laboratory cured specimens at 28 days. Hold one specimen in reserve for 56 day testing if required. Note that if 4” x 8” cylinders are used, a minimum of 3 specimens are required to be tested at 28 days.
    b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

6. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
8. Test results shall be reported in writing to Architect, SER, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, concrete mix design number, compressive breaking strength, and type of break for both 7- and 28-day tests.
9. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
10. Additional Tests: Testing agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.
11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements. When retesting of rejected materials or installed work is required, Contractor pays for tests. When retesting of installed work is required by the Architect due to negligence or improper construction practices by the Contractor, or low test results of Contractor installed work, the Contractor will be responsible for all costs pertaining to determination of acceptability of the work.
12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents at Contractor’s expense.

3.17 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION

SECTION 03 60 30 - NON-METALLIC GROUT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Grout for securing column base plates, anchor rods and other items bearing on concrete and/or masonry. This applies only to areas where not detailed otherwise on the drawings.

B. Related Sections:

1.	Cast-In-Place Concrete	Section 03 30 00
2.	Structural Steel	Section 05 12 00

C. The general provisions of the Contract, including General Conditions, Supplementary Conditions, and Special Conditions (if any) along with the General Requirements, apply to the work specified in this section.

D. Examine all Drawings and all other Sections of the Specifications for requirement therein affecting the work of this trade.

1.2 DEFINITIONS

A. SER: Structural Engineer of Record for this project.

B. Contractor: General Contractor. Also refers to Construction Manager when this form of construction is utilized on the project.

C. Sub-contractor: Provides materials or services for the project through the Contractor

1.3 INFORMATION SUBMITTALS

A. General:

1. Submit all documents in conformance to Specification Section 01 00 00.
2. Electronic submittals are required and printed copies are not acceptable unless specifically allowed by contract with the Owner.
3. Review of shop drawings does not constitute authorization to vary from the contract documents.
4. Submittal Scheduling: The Contractor shall be responsible for scheduling submittals with ample time allotted for the review process and possible resubmittals.

B. Product Data: Manufacturer's literature shall include storage, surface preparation, mixing and application instructions.

C. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.

D. Test Data: Confirm grout performance is compliant with specified requirements in Section 2.1A.

E. Test Reports:

1. Report test results to Architect and SER immediately after tests are made.
2. Reports of compressive strength tests shall contain the grout set number, project identification name and number, date of concrete placement, name of Contractor, name of grout manufacturer, name of testing service, grout type, location of grout batch placed in the structure, design compressive strengths at 28 days, compressive breaking strength, type of break 3 day, 7 day and 28 day tests.
3. Refer to Section 4.1B.

1.4 QUALITY ASSURANCE

A. Applicable reference Specifications and Standards: Comply with provisions of the following specifications and standards, except where more stringent requirements are shown or specified. All specifications and standards referred to shall be latest editions:

1. ACOE CRD-C621 – Specification for Nonshrink Grout.
2. ASTM C 78 / C 78M – Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).
3. ASTM C 190 – Method of Test for Tensile Strength of Hydraulic Cement Mortars.
4. ASTM C 191 – Standard Test Methods for Time of Setting of Hydraulic Cement by Vicat Needle.
5. ASTM C 469 / C 469M – Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression.
6. ASTM C 496 / C 496M – Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.
7. ASTM C 531 – Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.
8. ASTM C 939 – Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
9. ASTM C 942 – Standard Test Method for Compressive Strength of Grouts for Preplaced-Aggregate Concrete in the Laboratory.
10. ASTM C 1090 – Standard Test Method for Measuring Changes in Height of Cylindrical Specimens of Hydraulic-Cement Grout.
11. ASTM C 1107 / C 1107M – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
12. ASTM C 1315 – Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

B. Workmanship: Contractor’s personnel must have prior experience in mixing and applying specified product or similar products, or have manufacturer’s representative on site ensuring that preparation and application are performed correctly.

C. Delivery, Storage, and Handling

1. Delivery Requirements: Deliver materials to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
2. Storage and Handling Requirements:
3. Store and handle materials in accordance with manufacturer’s instructions.
4. Keep materials in manufacturer’s original, unopened containers and packaging until application.
5. Store materials in clean, dry area indoors.
6. Do not store materials directly on floor.

7. Protect materials during storage, handling, and application to prevent contamination or damage.

PART 2 - PRODUCTS

2.1 GROUT MATERIAL:

A. Commercial Non-shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents in compliance with the following standard specifications:

1. ASTM C 1107.
2. Army Corps of Engineers CRD-C621

B. Physical Properties Performance Test Data:

1. Minimum Compressive Strength according to ASTM C 1107:

   a. 3 Days: 3,000 psi
   b. 28 Days: 8,000 psi

2. Flow Rate according to ASTM C 939/CRD-C621
3. Volume Change according to ASTM C 1090/CRD-C621

C. Approved Manufacturers:

1. NS Grout by The Euclid Chemical Company
2. Sure-Grip High Performance Grout, by Dayton Superior
3. Master Flow 100, Master Builders Solutions by BASF.
4. SC Precision Grout, by Specchem.
5. Engineer approved equal prior to bidding

PART 3 - EXECUTION

3.1 CONDITION OF PRECEDING WORK

A. Review Construction documents for locations to receive grout.

1. Grout under steel column base plates.
2. Other locations as indicated on the structural Construction Documents.

B. Notify the SER should constructed conditions at locations to receive grout are not in accordance with manufacturer's written specifications. (i.e. - Minimum or maximum placement thicknesses exceed approved product limitations).

1. Do not begin surface preparation or application until unacceptable conditions are corrected.

3.2 SURFACE PREPARATION

A. Prepare surfaces to be in contact with grout in accordance with manufacturer's written instructions.

1. Remove free-standing water from application area.
2. Clean and prepare surfaces in accordance with manufacturer's written instructions.

    a. Use surface cleaners only compatible with grout manufacturer's written instructions.
3. Saturate concrete surfaces with clean water for 24 hours just before grouting, or as required by manufacturer's written instructions.
4. Maintain surfaces to be in contact with grout at temperature ranges in accordance with manufacturer's written instructions prior to placing, throughout placing and during specified curing of grout.

B. Provide forms to receive grout placement. Form surfaces shall be clean per manufacturer's written instructions.

3.3 GROUT MIXING

A. Use only clean container as required for mixing with grout.

B. Use only clean potable water as required for mixing with grout.

C. Proportion water to mix with grout in accordance with manufacturer's written instructions.

D. Mix grout with water mechanically or by other means acceptable per manufacturer's written instructions.

3.4 GROUT PLACING

A. Place grout at required locations in accordance with manufacturer's written instructions.

B. Placing duration shall not exceed manufacturer's written instructions.

C. Placement and curing temperatures shall not exceed manufacturer's written limitations.

D. Place non-shrink grout in continuous pour to prevent entrapment of air or water.

1. Ensure non-shrink grout fills entire space being grouted and remains in contact with bearing surfaces throughout entire grouting process.
2. Use rod or strapping as required to assist in uniform placement.
3. Do not vibrate grout.

E. Discard grout that becomes unworkable.

F. Trim non-shrink grout surfaces immediately after placement and cover exposed grout with clean wet rags, or pond with water.

3.5 CURING

A. Cure in accordance with manufacturer's written instructions.

3.6 TESTING AGENCY

A. Testing: Contractor will engage a qualified testing agency to perform field tests and prepare test reports.

B. Grout Tests: Testing of samples of fresh grout obtained according to ASTM C 1107 shall be performed according to the following requirements:

1. Testing Frequency: Obtain a set of 4 cubes sampled from each day's grout placement.

    a. Obtain additional test sets if a noticeable change in the mixed grout consistency or color is noted between batches, or if the time or temperature limits specified are exceeded.
2. Record and Report Grout Manufacturer and type used, date/time mixed, and placement location.
3. Record and Report grout batch mixing and curing temperatures.
4. Laboratory cure grout specimens in accordance manufacturer's written instructions.
5. Perform Compressive-Strength Test results at 3, 7, and 28 days. Retain the last cube for 56-day strength testing, should it become required.
6. Test results shall be reported to Architect, SER, and Contractor within 48 hours of testing.
7. Grout compressive strength test reports shall contain Project identification name and number, date of grout placement, name of testing agency, grout manufacturer type location of grout batch in work, mixing and curing temperatures, compressive strength at 3, 7, and 28 days.

END OF SECTION

SECTION 04 05 00 - MASONRY GROUT

PART 1 GENERAL

1.1 SUMMARY

A. Section includes grout for masonry.

B. Related Sections:

1.	Cast-In-Place Concrete	Section 03 30 00
2.	Reinforced Unit Masonry	Section 04 23 00
3.	Masonry Assemblies	Section 04 20 00

C. The general provisions of the Contract, including General Conditions, Supplementary Conditions, and Special Conditions (if any) along with the General Requirements, apply to the work specified in this section.

D. Examine all Drawings and all other Sections of the Specifications for requirement therein affecting the work of this trade.

1.2 DEFINITIONS

A. SER: Structural Engineer of Record for the project.

B. Contractor: General Contractor. Also refers to Construction Manager when this form of construction is utilized on the project.

C. Sub-contractor: Provides materials or services for the project through the Contractor.

1.3 SUBMITTALS

A. General:

1. Submit all documents and samples in conformance to Specification Section 01 33 00.
2. Electronic submittals are required and printed copies are not acceptable unless specifically allowed by contract with the Owner.
3. Review of shop drawings does not constitute authorization to vary from the contract documents.
4. Submittal Scheduling: The Contractor shall be responsible for scheduling submittals with ample time allotted for the review process and possible resubmittals.

B. Manufacturer’s Data:

1. Submit manufacturer’s product data, with application and installation instructions, for all proprietary materials and items relative to the grout work.

C. Test Reports:

1. Report test results in writing to the Architect, Engineer and Contractor immediately after tests are made.
2. Reports of compressive strength tests shall contain the prism set number, product identification name and number, date of grout placement, name of Contractor, name of supplier, truck number, name of testing service, grout type and class, location of grout batch in structure, design compressive strengths at 28 days, compressive breaking strength, slump, air temperature, weather, and any water added after leaving the plant.

1.4 QUALITY ASSURANCE

A. Codes and Standards:

1. Comply with the provisions of the latest editions of the following codes, specifications and standards, except as shown or specified.
2. Where provisions of these codes and standards are in conflict with the building code in force for this project, the more stringent requirement shall govern.

    a. American Concrete Institute: ACI 530 and ASCE 5, Building Code Requirements for Masonry Structures.
    b. American Concrete Institute: ACI 530.1 and ASCE 6, Specification for Masonry Structures.
    c. American Society for Testing Materials (ASTM): All ASTM Standards shall apply where appropriate.

B. Workmanship:

1. The Contractor is responsible for correction of grout work which does not conform to the specified requirements, including strength, tolerances and finish.
2. Deficiencies shall be corrected as directed by the Architect and as specified herein, at no additional cost to the Owner.

C. Grout Testing Service:

1. The Contractor shall employ and pay all costs for an independent testing laboratory, acceptable to the Architect and Engineer, to perform required tests during construction.
2. Contractor shall notify laboratory three days in advance of schedule for grout placement and allow free access to the site for testing operations.

D. Material Sources:

1. Sources of materials must remain unchanged during the course of the work.
2. Any variation in materials will require retesting.
3. Certificates of material properties and compliance with specified requirements may be submitted in lieu of testing, when acceptable to the Architect, provided that the proposed materials have a satisfactory service record and have been tested within the past year and such previous tests have met the specified requirements.
4. Certificates of compliance for each material must be signed by the Contractor and the supplier.

E. Advanced Design Mix:

1. Comply with ASTM C 476. The Contractor shall furnish mix designs for each type of grout (i.e., aggregate size, slump, etc.) anticipated to be provided throughout the project. Furnish at least 14 days prior to any grout placement.

2. Mix designs shall be prepared by a qualified independent testing laboratory or the grout supplier's laboratory.

F. Quality Control Tests During Construction:

1. Grout shall be sampled and tested for adequacy of design for strength.
2. Test prisms shall be made, stored and tested by the testing laboratory.
3. Protect test prisms while stored on site.
4. Handle and store carefully prior to testing.
5. Grout shall be sampled and tested as follows:

a. Slump: Comply with ASTM C 143. One test for each set of prisms, taken at point of placement in the structure. Additional slump tests may be required when observed slumps appear to exceed the allowed limit.
b. Test Prisms: Comply with ASTM C 1019. Make one set of three test prisms for each 30 cubic yards, or fraction thereof, of each mix design of grout placed in any one day.
c. Compressive Strength Tests: Comply with ASTM C 617 and C 39. Test 1 prism at 7 days and 2 at 28 days. Additional samples shall be taken whenever there is any change in mix proportions, method of mixing, or materials used.
d. Tests of In-Place Grout: Testing service shall make additional tests of in-place grout when results indicate that specified grout strengths or other characteristics, such as complete filling of masonry cores, have not been met. Costs of tests shall be at Contractor's expense.

G. Perform Work in accordance with State of Florida standards.

H. Maintain one copy of each document on site.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F.

B. Hot Weather Requirements: In accordance with ACI 530.1 when ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph.

PART 2 PRODUCTS

2.1 GROUT MATERIALS

A. Cement: Portland Cement complying with ASTM C 150, Type I or Type III.

B. Lime: Hydrated Lime, Type S, complying with ASTM C 207.

C. Coarse Stone Aggregate: Crushed stone, rock or gravel complying with ASTM C 404 and C 33. Maximum size 3/8 inch with no material smaller than No. 30 sieve size.

D. Fine Aggregate: Clean, sharp silica or quartz sand complying with ASTM C 404.

E. Special Considerations: Aggregate shall be free of soft or friable particles and be free of unfavorable capillary absorption characteristics.

2.2 WATER

A. Clean, fresh, potable, free from acid, oil or other injurious matter.

2.3 ADMIXTURES

A. General:

1. No admixture shall be used in the manufacturer of grout without prior acceptance of the Architect and Engineer.
2. When any accepted admixture is used in the grout, the compressive strength, bond strength and flexural strength shall not be less than that of the specified grout strengths without admixtures.
3. Volume change of grout shall not be more with admixtures than without admixtures.
4. No grout ingredient shall contain more than 0.1% chloride ions or the amount present in municipal drinking water, whichever is less.

PART 3 EXECUTION

3.1 MASONRY GROUT QUALITY

A. General: Grout to be used for reinforced masonry shall comply with ASTM C 476 and as follows.

B. Mixing:

1. Proportions:

a. Fine Grout: For spaces (masonry cells) not exceeding 3 inches , grout mix shall consist of one (1) part Portland Cement, 0 to 1/10 part hydrated lime, and sand at 2-1/2 times the sum of the volumes of the cementitious materials.
b. Coarse Grout: For spaces (masonry cells) greater than 3 inches , grout mix shall consist of one (1) part Portland Cement, 0 to 1/10 part hydrated lime, sand (fine aggregate) at 2 times the sum of the volumes of the cementitious materials, and coarse aggregate at 2 times the sum of the volumes of the cementitious materials.
c. Water: Add enough water to bring grout to a consistency as fluid as possible without causing segregation of materials.

C. Strength

1. All grout shall have a minimum compressive strength at 28 days of 2,500 psi or as required by ASTM C 476, whichever is the greater.

D. Slump

1. Comply with ASTM C 143. Slump shall be 8 inches to 10 inches at point of placement in structure.

3.2 READY-MIX GROUT

A. If ready-mixed grout is used, the grout shall be mixed and delivered in accordance with the requirements set forth in ASTM C 94.

B. Mixers shall be in proper working order and appropriate for the intended use.

C. Mixer blades shall not have their height reduced by more than one inch.

D. Blades showing more wear than this shall be replaced or the mixer shall not be used.

E. Mixers shall be equipped with accurate and dependable water measuring devices.

F. Grout shall not be placed if it has been in the mixer for more than one and one-half hours after addition of the water or after grout has begun to heat up due to hydration.

3.3 GROUT PLACEMENT

A. General:

1. Grout shall be placed by the High-Lift or Low-Lift method of grouting.
2. Pump or place a uniform height of grout in maximum 5 foot lifts and immediately vibrate the grout.
3. Grout vibrations shall be performed not longer than 10 minutes after grout lift placement.

B. High-Lift Grouting:

1. Pour succeeding 5 foot (maximum) lifts after waiting 30 to 60 minutes to allow for settlement and absorption of excess water.
2. Reconsolidate top lift of pour after the required waiting period and fill any void left by settlement shrinkage with grout.

C. Low-Lift Grouting:

1. Rod or vibrate each grout lift during pouring operation, and again after excess moisture has been absorbed, but before plasticity is lost.

D. Preparation for Placement:

1. Prior to grout placement, remove all mortar droppings, protruding mortar, foreign materials or debris from masonry cells and lintels to be filled with grout.
2. The minimum clear vertical cell shall be 3 inches square or as required to properly position detailed reinforcing and provide specified clearances.
3. Notify Architect and inspection authorities at least 72 hours prior to a scheduled pour.

3.4 BONDING

A. General: If complete grouting of a scheduled pour cannot be completed, or time between placement of lifts will exceed the specified time, hold grout a minimum of 1-1/2 inches down from mortar joint to provide a horizontal key between successive lifts.

3.5 EMBEDDED ITEMS

A. General:

1. Set and build into the work any anchorage devices, steel angles and plates, or other embedded items required for the work that is attached to, or supported by reinforcement masonry.
2. Use setting drawings, diagrams, instructions and directions provided by the supplier of the items to be attached.
3. Where structural steel shapes and other members are shown bolted to the reinforced masonry, bolts shall be set in proper position and spacing in the masonry units before the grout is placed.
4. Bolts and nuts exposed to moisture conditions shall be galvanized.

END OF SECTION

SECTION 04 20 00 MASONRY ASSEMBLIES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:
1. Concrete masonry unit work, including Architectural CMU in addition to Standard.
2. Metal wall ties and anchors.
3. Masonry reinforcement.
4. Mortar for masonry work.
5. Material pointing, grouting and cleaning masonry work, particularly Architectural CMU.
6. Lintels and bond beams.
7. Membrane flashing and Fluid Applied Air & Water Resistive Barrier also referred to as Vapor Barrier.
8. And as required to complete the masonry assemblies as shown on drawings.

B. Related Work Specified Elsewhere:
1. Cast-in-Place Concrete: Section 03 30 00
2. Masonry Grout: Section 04 05 00
3. Reinforced Unit Masonry: Section 04 23 00.
4. Caulking: Section 07 90 00 - Joint Sealers.
5. Vapor Barrier: Section 07 27 20 – Fluid Applied Air & Water Resistive Barrier
6. Aluminum door frames: Section 08 40 00 - Aluminum Storefronts.
7. Division 16 for Electrical Systems.

C. Installed But Not Furnished: Insulation (section 07210), and miscellaneous metal items embedded in masonry, steel lintels, bolts, and anchors: Section 05500 - Metal Fabrications.

1.02 QUALITY ASSURANCE

A. Conform to requirements of American Concrete Institute (ACI), Building Code Requirements for Concrete Masonry Structures and Specification for Concrete Masonry Construction.

B. Acceptable Manufacturer: Regularly engaged in production of specified products.

C. Sample Wall Panel:
1. Construct 4 foot by 6 foot sample panel, adequately braced and protected, with one 90 degree corner. Sample wall shall remain standing during the course of the construction and acceptance of the masonry work, and will be used as a standard for all masonry work.
   a. Use full size masonry units to show full masonry/finish system construction, color range, maximum texture range, bond, mortar, finish of joints, reinforcing, insulation and quality of workmanship.
   b. Do not proceed with work until panel is accepted by Architect.
   c. Retain accepted sample as reference standard for project.
2. At contractor's option, sample wall panel may be utilized in the construction of the Work. Otherwise, demolish and remove sample panel from project site after completion and acceptance of project masonry work by Architect.

1.03 SUBMITTALS

A. Samples: Five individual samples of architectural concrete masonry units (CMU) showing extreme variations in color and texture. Full range of available mortar colors. Printed color charts are not acceptable.

B. Certifications: Furnish manufacturer's certification that materials meet specification requirements.

C. Mix design of grout showing compliance with specified standards.

D. Product Literature indicating compliance with specifications for wall ties, anchors reinforcing, membrane flashing, and dampproofing.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver and store manufactured products in original unopened containers.

B. Store cementitious ingredients in weather tight enclosures and protect against contamination and warehouse set.

C. Stockpile and handle aggregates to prevent contamination.

D. Keep water free of harmful materials.

E. Deliver reinforcing and accessories in original unopened containers or in bundles marked with metal tags indicating material and size.

F. Store masonry units above ground on level platforms that allow air circulation under stacked units.
   1. Handle units in manner that will prevent chipping or cracking.
   2. Protect units against wetting and dusting on job site.
   3. Handle units on pallets or flat bed barrows.

G. Vapors of certain dampproofing products are harmful or flammable. Follow manufacturer's recommendations regarding safe handling, storage, personal protection, health and environmental consideration. Apply dampproofing only when existing and forecasts indicate dry weather. Follow manufacturer's instructions regarding proper temperature ranges for installation.

H. Dampproofing may be incompatible with certain sealant products. Verify with manufacturer prior to installation.

1.05 JOB CONDITIONS

A. Weather Conditions:
   1. Do not erect masonry when temperature is 40 degrees F and falling except by written approval of Architect. Do not build upon frozen work. Protect masonry from freezing for 48 hours after laying.
   2. Protect masonry from rain as described in Part 3.

3. During hot weather conditions, protect masonry construction from direct exposure to wind and sun when erected in ambient air temperature of 99 degrees F., or higher, in shade with relative humidity less than 50 percent.
4. Maintain mortar between 70 and 120 degrees F.

PART 2 - PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. General:
1. Aggregate: Normal weight unless otherwise specified or specifically shown otherwise on drawings.
2. Size and Shape: Modular units of nominal dimensions (8 inches by 16 inches face dimensions, unless otherwise noted for width as shown on drawings) including all special shapes and sizes required to complete work.
3. Appearance: Fine texture, free of cracks, chips, and surface defects noticeable at a distance of 12 feet, if exposed.

B. Types:
1. Hollow Load Bearing:
   a. Conform to ASTM C 90, Type II
   b. Minimum Compressive Strength: f=m = 1,500 psi.
2. Hollow Non-Load Bearing: Conform to ASTM C 129, Type II.
3. Concrete Building Brick: Conform to ASTM C55, Grade N-II.
4. Architectural Concrete Masonry Units, including load bearing conforming to ASTM C 90, Type I: Nominal size 8" x 16" face dimension 8" depth and 12" depth, equal to Trendstone, ground face, by Trenwyth industries, color: Natural. Masonry units shall be manufactured with W.R. Grace Dryblock water repellent admixture.

2.02 MORTAR (GROUT, See 04 05 00)

A. Cements:
1. Mortar:
   a. Portland: Conform to ASTM C 150, Type I.
   b. Masonry: Conform to ASTM C 91.
2. Grout: Portland cement conforming to ASTM C 150. Type I.
3. Color of mortar for brick and CMU including Architectural CMU, gray mortar. [Note, for further clarification, if the cost is less to construct the architectural CMU with mortar that matches the architectural CMU due to care required to keep all mortar off face surface during installation, this is acceptable.]

B. Lime: Hydrated, conform to ASTM C 207, Type AS.

C. Aggregate:
1. Mortar: Conform to ASTM C 144, fineness modulus 1.8 to 2.2.
2. Grout: Conform to ASTM C 404 and see 04 05 00.

D. Admix: Cement dispersing and water repellent agent, conform to ASTM C 494; water repellent agent equal to W. R. Grace Dryblock water repellent mortar additive, following manufacturer's instructions, to be used in all exterior mortar.

E. Water: Clean and free of deleterious substances, oils, acids, salts, and chlorides.

2.03 ACCESSORIES

A. Horizontal Joint Reinforcing:
   1. Fabricate from cold drawn wire, conforming to ANSI/ASTM A82, hot dip galvanized after fabrication.
   2. Longitudinal Wires: Deformed, 9 gauge or larger.
   3. Cross Wires: Deformed or smooth, 9 gauge or larger.
   4. Weld cross wires at 16-inch intervals to longitudinal wires; ladder type.
   5. Width of Assembly: Two inches less than nominal wall thickness.

B. Reinforcing Bars for Lintels, Bond Beams and Vertical Cells: Comply with 04 23 00 Reinforced Unit Masonry and conform to ASTM A 615, Grade 60 and as indicated on drawings.

C. Anchors and Ties: General: Standard designs, copper clad steel, galvanized steel, or non-corrosive metal having equivalent total strength of steel types.

D. Bond Inhibitors: Non-petroleum based, not harmful to masonry work or adjoining materials.

F. Control Joint Material:
   1. One of the following:
      a. Preformed rubber, neoprene or polyvinyl chloride material.
         (1) Provide with corner and tee accessories.
         (2) Heat or cement fused joints.
         (3) Acceptable:
            (a) Dur-O-Wall, Inc.
            (b) Williams Products, Inc.
            (c) Substitutions; Items of same function and performance by other manufacturers are acceptable as approved by Architect.
      b. Building Paper: Asphalt saturated felt, ASTM D 226, Type II (30 Pounds), nonperforated.
   2. Joint Fillers: See Section 07900 - Joint Sealers.

G. Membrane Flashing: For miscellaneous flashing, including thru-wall, lintel, sill and spandrel flashings and flashings at heads of openings use one of following:
   1. Rubberized Asphalt:

      a. Self-Adhering 40 mil membrane consisting of 32 mils of pliable, highly adhesive rubberized asphalt completely and integrally bonded to 8 mil, high density, and cross-laminated polyethylene film.
      b. Acceptable: W.R. Grace & Co., Perm-A-Barrier Wall Flashing.

H. Dampproofing: for concealed in wall uses behind stucco, provide type of bituminous dampproofing material that is warranted by manufacturers to be odor-free after drying for 24 hours under normal conditions. Dampproofing shall be cold-applied asphalt-and-water-emulsion coating, compounded to penetrate substrate and build to moisture resistant coating. Provide liquid asbestos-free emulsion; ASTM D 1227, Type III.

PART 3 - EXECUTION

3.01 INSPECTION

A. Inspect foundation surfaces to support masonry units to assure they are to correct grades and elevations.

B. Verify that surfaces are free of all dirt and other deleterious material.

3.02 MORTAR AND GROUT

A. Mixing:
1. Mix ingredients in clean mechanical batch type mixer to uniform color and consistency.
2. Do not mix greater quantity than can be used within 2-1/2 hours.
3. Re-tempering of mortar or grout in which cement has begun to set will not be permitted.
4. Water to replace loss due to evaporation may be added up to 2-1/2 hours after initial mixing.
5. Keep equipment clean.

3.03 INSTALLATION

A. General:
1. Verify coursing prior to start of work.
2. Do not use cracked, broken, or chipped masonry units.
3. Use masonry saws to cut and fit masonry units.
4. Architectural CMU: **Install preparation and installation of Architectural CMU in <u>strict accordance with Manufacturer's published instructions.</u>**
5. Set units plumb, true to lines, and brick and block with level courses accurately spaced.
   a. Adjust masonry unit to final position while mortar is soft and plastic.
   b. If units are displaced after mortar has stiffened, remove, clean joints and units of mortar, and relay with fresh mortar.
6. When joining fresh masonry to set or partially set masonry construction, clean exposed surfaces of set masonry and remove loose mortar prior to laying fresh masonry.
7. Where masonry work is not exposed to view such as below slab Standard CMU acceptable.

B. Protection of Work:
1. Protect existing adjacent work from damage during construction.
2. Cover top of exterior walls with non-staining waterproof coverings when work is not in progress.
3. Protect face materials against staining.
4. Adequately brace all masonry walls exposed to wind and/or other lateral loads.
5. Apply bond inhibitor as required preventing cementitious material from bonding to adjoining metals, glass and other materials.

C. Mortar Beds:
1. Concrete Masonry Units:
   a. Hollow Units:
      (1) Lay with full mortar coverage on horizontal and vertical face shells.
      (2) Provide full mortar coverage on horizontal and vertical face shells and webs in all courses of piers, columns, and pilasters, in starting course on slabs, footings, and foundation walls, and where adjacent to cells or cavities to be reinforced and/or filled with grout or concrete.

b. Solid Units: Lay with full coverage on horizontal and vertical faces.

D. Joints:
1. Nominal Thickness: 3/8 inch
2. Construct uniform joints.
3. Shove vertical joints tight, removing excess mortar.
4. Exterior and Interior Joints::
   a. Exposed: Tool concave with 3/4-inch diameter tool, u.o.n.
   b. Concealed Joints: Strike flush.
5. Fill horizontal joints with mortar between top of masonry walls and partitions and underside of structure above with mortar, unless otherwise shown on drawings.

E. Joint Reinforcing:
1. Place reinforcement so that longitudinal wires are located over shell mortar with minimum mortar cover of 5/8 inch on exterior side of walls and 2 inch cover elsewhere.
2. Provide in all masonry walls at 16 inches on center vertically and in 2 successive joints above and below openings.
3. Extend reinforcing at openings 24 inches beyond each side of opening or to end of panel if distance is less than 24 inches.
4. Lap splices 12 inches.
5. Install factory-fabricated sections at wall and corner intersections.
6. Interrupt reinforcing at control joints and expansion joints.

F. Vertical Reinforcing:
1. Position reinforcing accurately.
2. Form splices by lapping bars not less than 48 diameters and wire tying.
3. Maintain minimum clearance of 2 inch between reinforcing and masonry.
4. Hook vertical reinforcing into bond beams.

G. Grouting:
1. Align vertical cells of concrete masonry units to be filled with grout to provide continuous unobstructed opening.
2. Avoid obstructions in core that prevent proper grout fill.
3. Place grout in 4 feet lifts.
4. Obtain approval from Architect if grouting is to be done in higher lifts. Provide clean-out holes and lifts shall not exceed eight (8) feet.
5. Do not begin placement of grout until alignment of cells is inspected and approved by Architect.

H. Bonding:
1. Masonry to Steel: Weld-on adjustable column anchors at 24 inches on centers.
2. Intersecting of Abutting Walls and Partitions:
   a. Lay at least 50 percent of units at intersection in masonry bond with 3 inches (minimum) bearing of alternate units on unit below.
   b. At non-load bearing walls or partitions carried up separately provide wall ties at 24 inches on centers.
   c. At load bearing walls or partitions carried up separately provide rigid steel anchors at 24 inches on centers.

I. Control and Expansion Joints:
1. Spacing:

a. Expansion Joints: At building expansion joint lines.
b. Control Joints: Three times ratio of panel length to height (L/H) with panel length not to exceed 50 feet, and aligning with exterior finish joints.

2. One of the following:

a. Form with building paper bond breaker fitted to one side of hollow contour of block unit.
(1) Fill resultant core with grout fill.
(2) Rake joint at exposed face for placement of backer rod and sealant.

b. Preformed Control Joint Device:
(1) Install in continuous lengths.
(2) Seal butt and corner joints in accordance with manufacturer's instructions.

c. Size control joint in accordance with Section 07900 - Joint Sealers for sealant performance.

J. Built-In Work:
1. Avoid cutting and patching.
2. Install bolts, anchors, nailers, inserts, frames, flashing, conduit, pipe, wood plugs, and other similar built-in items as masonry work progresses.
3. Solidly grout spaces around built-in items.
4. Fill cells, as work progresses, with grout where anchors, bolts and ties occur within cells of units.
5. Build walls and partitions enclosing piping only after pipes are in place, tested, and approved.
6. Coordinate erection of walls and partitions with installation of electric conduit, wall boxes, and piping.
7. Where masonry will remain exposed cut neatly for electrical outlets and similar items. Note locations where Electrical boxes to be exposed and surface mounted in controlled design configuration.
8. Membrane Flashing:
a. Clean surface of masonry smooth and free from projections that might puncture or damage flashing material.
b. Place through-wall flashing on bed of mortar and cover flashing with mortar.

K. Concrete Masonry Unit Lintels and Bond Beams:
1. Form of lintel block, fill cells solidly with grout or concrete, and provide with not less than two #5 reinforcing bars unless otherwise shown on drawings.
2. Lap reinforcing a minimum of 48 bar diameters at splices.
3. Break bond beams and reinforcing at expansion joints.
4. Use special shaped concrete masonry units for bond beams and lintels.
5. Match material and texture of adjoining masonry units.
6. Build lintels straight and true with at least 8 inches of bearing each end.
7. Fill cells of units a minimum of 2 courses below lintel bearing with grout.

L. Preparation for Vapor Barrier/Drainage Plane:
1. All concrete and masonry shall be cured a minimum of seven (7) days and be dry before application of Barrier. Prior to application of Barrier, surfaces shall be inspected and repaired as required by manufacturer to provide proper surfaces to receive barrier. All surfaces shall be free of voids, spalled areas, loose aggregate and sharp protrusions, with no coarse aggregate visible. Remove all contaminates from the surface and clean surface (broom, vacuum cleaner or compressed air) to remove dust, dirt, loose stones and debris. Repair concrete and CMU in the following

manner.

- Bugholes over 1/2 inch (13 mm) in length and 1/4 inch (6mm) deep shall be plugged with concrete finished flush with surrounding surfaces.
- Form tie rod holes must be filled flush with surrounding surfaces.
- Fins shall be ground smooth.
- Scaling shall be removed to sound, unaffected concrete and the exposed area repaired.
- Irregular construction joints shall be corrected by feathering the repair material or by grinding.

3. Install flashing and corner protection stripping as recommended by barrier materials manufacturer, preceding application.
4. Application of primer shall be in accordance with the materials manufacturer.

3.04 POINTING AND CLEANING

A. At final completion of masonry work fill holes in joints and tool.

B. Cut out and repoint defective joints.

C. Dry brush masonry surface after mortar has been set, at end of each days work, and after final pointing. NOTE: Architectural Concrete Masonry Units to be kept clean throughout construction in strict accordance to manufacturers published instructions.

D. Leave work and surrounding surfaces clean and free of mortar spots and droppings.

E. Clean exposed masonry work with cleaning agents as recommended by manufacturer of cleaning agent and manufacturer of masonry unit to be cleaned.

F. Clean masonry from top down.

End of Section

SECTION 04 23 00 – REINFORCED UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes reinforced masonry installation, reinforcement, and forming as required to complete this project. All reinforced masonry installation shall conform to the requirements of this and referenced specifications.

B. Related Sections:

1.	Cast-In-Place Concrete	Section 03 30 00
2.	Masonry Grout	Section 04 05 00
3.	Masonry Assemblies	Section 04 20 00

C. The general provisions of the Contract, including General Conditions, Supplementary Conditions, Special Conditions (if any) along with the General Requirements, apply to the work specified in this section.

D. Examine all Drawings and all other Sections of the Specifications for requirement therein affecting the work of this trade.

1.2 DEFINITIONS

A. SER: Structural Engineer of Record for the project.

B. Contractor: General Contractor. Also refers to Construction Manager when this form of construction is utilized on the project.

C. Sub-contractor: Provides materials or services for the project through the Contractor.

1.3 SUBMITTALS

A. General:

1. Submit all documents and samples in conformance to Specification Section 01 33 00.
2. Electronic submittals are required and printed copies are not acceptable unless specifically allowed by contract with the Owner.
3. Review of shop drawings does not constitute authorization to vary from the contract documents.
4. Submittal Scheduling: The Contractor shall be responsible for scheduling submittals with ample time allotted for the review process and possible resubmittals.

B. Mill Certificates: Submit certificates as follows:

1. Certificate of compliance for concrete masonry units, aggregates, cement, and lime.
2. Steel producer's certificates of mill analysis, tensile and bend tests for reinforcement steel required for project.

C. Fire Resistance Documentation:

1. Submit documents indicating the material composition, equivalent thickness, and hourly fire rating provided by unfilled block units in conformance to the requirements of the Quality Assurance Article of this Specification Section for all concrete masonry to be installed as part of a fire rated assembly.

D. Mix Design for Grout: At the same time as the Concrete Masonry submittal, submit documents required by Specification Section 04 05 00 – Masonry Grout as a separate submittal number.

E. Test Reports: Submit reports on all tests required herein.

F. Shop Drawings for Reinforcing:

1. Submit shop drawings for fabrication, bending, and placement of all reinforcement bars.

a. Comply with ACI 315 “Manual of Standard Practice for Detailing Reinforced Concrete Structures”.
b. Electronic submittal is required and file format utilizing PDF format is preferred.
c. Drawings shall be clearly marked “FOR APPROVAL ONLY – NOT FOR FIELD USE”. If drawings are not approved but are returned for corrections, the approval copies shall be resubmitted. After initial review has been made, final drawings shall be resubmitted, with all corrections made, for final review, stamped “FOR FIELD USE”.
d. Verify necessary dimensions at the project site and be responsible for dimensional correctness and accurately fitting work of this Section.

2. Computer drawing files are available for use in the production of shop drawings if allowed by the Architect. Requirements include disclaimer provided by the Engineer and which is to be accepted and signed by the Contractor as well as the sub-contractor requesting the files.
3. Show bar schedules, diagrams of bent bars, stirrup spacing, lateral ties and other arrangements and assemblies as required for fabrication and placement of reinforcement for unit masonry work.

1.4 SUSTAINABLE DESIGN SUBMITTALS

A. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements as established in Specification Section 01 33 00.

B. Materials Resources Certificates:

1. Certify recycled material content for recycled content products.

a. Provide documentation indicating percentages of post-consumer and pre-consumer recycled content by weight per unit of product or assembly containing the product.
b. Indicate the percentage of the dollar value of the recycled content compared to the total dollar value of the product or assembly containing the product.

C. Regional Materials Certificates:

1. Indicate location and distance for all materials where the distance to the source of extraction, recovery, processing, and manufacturing is 500 miles or less from the Project site.

a. Indicate the dollar value of the material cost of the product containing local/regional materials.
b. Where product components are sourced or manufactured in separate locations, provide location and percentage by weight of each component per unit of product.

1.5 QUALITY ASSURANCE

A. Reinforced Masonry Standards:

1. All concrete masonry work shall comply with the latest edition of the Specifications for Masonry Structures (ACI 530.1/ASCE 6) except as noted herein.

B. Concrete Masonry for Fire Rated Construction:

1. All concrete masonry to be installed as part of a fire rated assembly shall have their equivalent thickness calculated based on their material composition and nominal unit width in accordance with the latest edition of ASTM C140.

   a. The equivalent thickness shall be used to determine the appropriateness of concrete masonry units to be installed for the required hourly fire rating of Project fire assemblies.

2. The hourly rating provided by an unfilled or non-grouted concrete masonry unit shall be based on the currently enforced edition of the Florida Building Code for all concrete masonry to be installed as part of a fire rated assembly.

   a. Underwriter's Laboratory (UL) tested and listed CMU assemblies shall only be considered if deemed acceptable by the Code Authority Having Jurisdiction over this Project.
   b. The Contractor shall notify the Architect, in writing, if concrete masonry intended for fire rated assemblies will not provide the required hourly rating as an unfilled unit and propose remedial course of action for Architect's review and approval.
      1) Only remedial action approved by the Architect will be carried out.

C. General Testing Requirements:

1. Submit all test reports required by this Spec Section within 3 days of completion of the test to permit verification of compliance with the requirements of the Construction Documents.

   a. These findings shall be reported both electronically and in print to the Architect and Engineer.
   b. The Contractor shall keep a log of all testing with date of submittal to the Architect and Engineer indicated for each entry.

D. Grout Testing: Refer to Specification Section 04 05 00 – Masonry Grout.

E. Mortar Testing: Refer to Specification Section 04 20 00 – Masonry Assemblies.

F. The Contractor shall employ and pay an independent testing laboratory, acceptable to the Architect and Engineer, to provide the following tests:

1. Lab Qualifications: Testing laboratory shall meet the requirements of ASTM E329.
2. Concrete Masonry Unit Tests (Preconstruction):

a. Prior to any construction, verify by laboratory tests in accordance with ASTM C140 that the concrete masonry units to be used on this project comply with the project requirements.
   1) Tests for the following information: compressive strength, absorption, unit weight (density), moisture content, and dimensions.
   2) Test 6 units minimum for the first lot of 10,000 units scheduled for the project and 6 additional units for every 50,000 units thereafter which are scheduled for the project.

3. Concrete Masonry Unit Tests (During Construction):

   a. During construction, verify by laboratory tests in accordance with ASTM C 140 that the concrete masonry units being used on the project comply with the project requirements and reflect similar results to the preconstruction tests.
   b. Test 6 units for every 10,000 square feet of each type of masonry constructed.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F (4 degrees C).

B. Hot Weather Requirements: In accordance with ACI 530.1 when ambient temperature is greater than 100 degrees F (38 degrees C) or ambient temperature is greater than 90 degrees F (32 degrees C) with wind velocity greater than 8 mph (13 km/h).

PART 2 PRODUCTS

2.1 SUSTAINABILITY CHARACTERISTICS

A. Materials and Resources Characteristics:

   1. Recycled Content Materials: Furnish materials with maximum available recycled content.
   2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

2.2 MATERIALS

A. Concrete Masonry Units (CMU):

   1. General:

      a. Refer to Section 04 20 00 – Masonry Assemblies for masonry materials and accessories not included in this section.
      b. Aggregate: All aggregate shall consist of clean, hard, uncoated grains, uniform in color, free from dust, soft or flaky particles, shale, alkali, organic matter, loam, or other deleterious substances.

   2. Smooth Face Units:

      a. Unless required otherwise by the Architect, normal, blended or lightweight units conforming to ASTM C 90 and, in addition, to the requirements of the Quality Control Standards of the National Concrete Masonry Association.

b. The units shall have a minimum compressive strength of 2000 psi on the net cross-sectional area.
c. Units shall have cured for not less than 28 days when placed in the structure.
d. Units shall be of cellular construction, with the cells vertical and an exposed face of 7-5/8 inches high x 15-5/8 inches long (8 inches x 16 inches nominal sized) x the (nominal) thicknesses indicated on the Drawings.

B. Reinforcement:

1. Deformed Reinforcement Bars: Provide deformed bars of following grades complying with ASTM A615, except as otherwise indicated.

a. Provide Grade 60 for bars No. 3 to No. 18, except as otherwise indicated.
b. Where No. 2 bars are shown, provide plain, round, carbon steel bars, ASTM A675. Grade 80.
c. Shop-fabricate reinforcement bars which are shown to be bent or hooked.

2. Welded Wire Reinforcement: Provide wire reinforcement conforming to ASTM A82.

a. For joint reinforcement in concrete masonry, provide welded wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet, with prefabricated corner and tee units.
b. Width shall be approximately two inches less than the nominal width of walls as required to provide mortar coverage of not less than 5/8 inch on joint faces exposed to the exterior and 1/2 inch elsewhere.
c. Wire size for side rods shall be 0.1875-inch diameter.
1) Optionally, the Contractor may submit #8 side rods for installation at 8 inches o.c.
d. Wire size for cross-rods shall be #8.
e. Joint reinforcement shall be of a ladder design.
1) Joint reinforcement for exterior wall construction shall be hot dipped galvanized after fabrication in accordance with ASTM A153, Class B-2.
2) Joint reinforcement for interior wall construction shall be mill galvanized in accordance with ASTM A641, Class I.
f. Provide and install prefabricated “L” and “T” of the same construction as the main units to provide continuity at corners and intersections.

PART 3 EXECUTION

3.1 INSTALLATION – GENERAL

A. Refer to Section 04 20 00 – Masonry Assemblies for general installation requirements of unit masonry

B. All masonry shall be laid true, level, plumb and neat, reflecting the highest quality of workmanship. Masonry units shall be sound, dry, clean, and free from cracks when placed. Wetting of concrete masonry units shall not be permitted.

C. Proper masonry units shall be used to minimize cutting of units. Where cutting is necessary, all cuts shall be neat and true, and shall be cut using motor-driven saws. Provide the necessary materials to cover and to protect the masonry units and the walls from weather and other dangers during the progress of the work.

D. Use special shaped units where shown, and as required for corners, jambs, sashes, control joints, lintels, bond beams and other special conditions.

1. Where shaped units are part of a decorative CMU assembly, use shaped unit of the same character and appearance.

E. The top surface of the concrete foundation shall be clean, all laitance removed, and aggregate exposed before starting the masonry construction.

F. Use continuous dovetail anchors between masonry units and cast-in-place concrete members.

G. Coordinate placement of all built-in work, bearing plates, and anchors supplied by other sections.

H. Temporary Formwork: Provide formwork and shores as required for temporary support of reinforced masonry elements.

1. Construct formwork to conform to shape, line and dimensions shown. Make sufficiently tight to prevent leakage of mortar, grout, or concrete (if any). Brace, tie, and support as required in order to maintain position and shape during construction and curing of reinforced masonry.

I. Isolate masonry partitions from vertical structural framing members with movement joint as indicated on drawings.

J. Isolate top of masonry from horizontal structural framing members and slabs or decks as detailed on the drawings.

3.2 REINFORCEMENT

A. General:

1. Clean reinforcement of loose rust, mill scale, concrete, earth, ice or other materials which will reduce bond to mortar or grout.
2. Reinforcing bars shall be straight except for bends around corners and where bends or hooks are indicated on the Drawings or approved shop drawings.

a. Do not use reinforcement bars 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.
b. Foundation dowels shall not slope more than 1:6 (H:V), and shall be grouted into a core in vertical alignment.

B. Position reinforcement accurately at the spacing indicated.

1. Support and secure vertical bars against displacement.

a. Vertical bars shall be held in position at the top and bottom and at intervals not exceeding 192 bar diameters.

2. Keep reinforcing bars clear of adjacent components.

a. Vertical bars shall have a minimum clearance of 1/4 inch from the masonry.
b. Where vertical bars are shown in close proximity, provide a clear distance between bars of not less than the nominal bar diameter or 1 inch, whichever is greater.

c. For columns, piers and pilasters, provide a clear distance between vertical bars as indicated, but not less than 1-1/2 times the nominal bar diameter or 1-1/2 inches, whichever is greater. Provide lateral ties as indicated.

3. Horizontal reinforcement shall be placed as the masonry work progresses.

a. Horizontal bars shall be laid on the webs of the units in continuous masonry courses, consisting of bond beam or channel units, and shall be solidly grouted in place.

C. Extend reinforcement beyond top of masonry lift as required for splicing. Pour grout to within 1-1/2" of top course of first pour. After grouted masonry is cured, lay masonry units and place reinforcement for second pour section before grouting. Repeat sequences if more pours are required.

D. Splice reinforcement bars where shown; do not splice at other points unless acceptable to the Engineer. Provide lapped splices, unless otherwise indicated. In splicing vertical bars or with dowels, lap ends, place in contact and wire-tie together. Lap bars side by side in plane of wall to maintain proper clearances.

1. Provide not less than minimum lap shown, or if not indicated, as required by governing code or 48 times the bar diameter, whichever is greater.

E. Embed metal ties in mortar joints as work progresses, with a minimum mortar cover of 5/8 inch on exterior face of walls and ½ inch at other locations.

F. Horizontal Joint Reinforcement:

1. Unless otherwise indicated, provide horizontal joint reinforcement in every other horizontal joint for 3/16 inch side rod reinforcing, or on every joint for #8 side rod reinforcing.
2. Embed prefabricated horizontal joint reinforcement as the work progresses, with a minimum cover of 5/8 inch on exterior face of walls and ½ inch at other locations.
3. Wire reinforcement shall be lapped at least 6 inches at splices and shall contain at least one cross-wire of each piece of reinforcement in the lap distance.
4. Install prefabricated "L" and "T" at their respective corner and intersection conditions.

a. Cut and bend units only as recommended by manufacturer for continuity at returns, offsets, pipe enclosures and other special conditions.
b. Field cut and shaped corner "L's" and intersection "T's" are strictly prohibited.

G. Lateral Tie Reinforcement:

1. Embed lateral tie reinforcement in mortar joints where indicated. Place reinforcement at vertical spacing shown as masonry units are laid.
2. Where lateral ties are shown in contact with vertical reinforcement bars, embed additional lateral tie reinforcement in mortar joints. Place as shown, or if not shown, provide as required to prevent grout blowout or rupture of CMU face shells, but provide not less than No. 2 bars or 8-gage wire ties spaced 16 inches o.c. for members with 20 inches or less side dimensions, and 8 inches o.c. for members with side dimensions exceeding 20 inches.

3.3 INSTALLATION OF REINFORCED CONCRETE UNIT MASONRY

A. General:

1. Do not wet concrete masonry units (CMU) except for saw cutting per OSHA requirements.
2. Lay CMU units with full-face shell mortar beds. Fill vertical head joints (end joints between units) solidly with mortar from face of unit to a distance behind face equal to not less than the thickness of longitudinal face shells. Solidly bed cross-webs in mortar in starting courses and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be reinforced and filled with grout. Maintain head and bed joint widths shown, or if not shown, provide 3/8 inch joints.

    a. Where solid CMU units are shown, lay with full mortar head and bed joints.

B. Walls:

1. Pattern Bond: Lay CMU wall units in a 1/2-running bond with vertical joints in each course centered on units in courses above and below, unless otherwise indicated.
2. Bond and interlock each course at corners and intersections. Reinforce and solid-grout all cells at corners and intersections.

    a. Corners shall have a standard masonry bond by overlapping units.
    b. Intersecting masonry walls without control joints shall be interlocked by 50% overlap.

3. All masonry below grade shall be solid-grouted.
4. Maintain vertical continuity of core or cell cavities, which are to be reinforced and grouted, to provide minimum clear dimensions indicated and to provide minimum clearance and grout coverage for vertical reinforcement bars. Keep cavities free of mortar. Solidly bed webs in mortar where adjacent to reinforced cores or cells.
5. Place horizontal beam reinforcement as the masonry units are laid.
6. Where horizontal reinforced beams (bond beams) are shown, use special units or modify regular units to allow for placement of continuous horizontal reinforcement bars. Place small mesh expanded metal lath or wire screening in mortar joints under bond beam courses over cores or cells of non-reinforced vertical cells, or provide units with solid bottoms (unless shown otherwise). Do not use building paper or sheet plastic to close voids due to breakage of mortar bond.

    a. Option: Where all vertical cores are not shown to be grouted. Contractor may elect to fill all vertical cores with grout provided that the area is not supported by beams but is continuous to the foundation.

C. Columns, Piers and Pilasters:

1. Use CMU units of the size, shape and number of vertical core spaces shown. If not shown, use units which provide minimum clearances and grout coverage for the number and size of vertical reinforcement bars shown.
2. Provide pattern bond shown, or if not shown, alternate head joints in vertical alignment.
3. Where bonded pilaster construction is shown, lay wall and pilaster units together to maximum pour height specified.

3.4 MORTAR

A. All mortar used for concrete masonry shall conform to the requirements of Specification Section 04 20 00 – Masonry Assemblies.

B. Mix mortar in a power-driven batch mixer of one bag minimum capacity for at least three minutes after all materials have been added.

C. Hand mixing will not be allowed. Use mortar within two hours after mixing; discard mortar not used within this time limit. Retempering will be allowed to restore the required consistency as needed until the two hour limit is reached.

D. Mortar joints shall be 3/8-inch thick with full mortar coverage on the face shells and webs surrounding the cells to be filled.

1. Interior Joints shall be:

a. Tooled at faces to be painted.
b. Flush at faces to received drywall, hardcoat or ceramic tile.

2. Exterior Joints shall be:

a. Tooled at faces to be exposed.
b. Flush at faces to receive brick, ceramic tile or other veneer.

3. Joints of 8" wide units shall be laid with the interior faces true.
4. Joints of 4" wide units (to receive stucco) shall be laid with exterior faces true.

E. The starting joint on foundations shall be laid with full mortar coverage on the bed joint except that the area where grout occurs shall be free from mortar so that the grout will contact the foundation.

3.5 GROUTING

A. General:

1. Refer to Section 04 05 00 – Masonry Grout.
2. Use “Fine Grout” per ASTM C476 for filling spaces less than 3 inches in one or both horizontal directions.
3. Use “Course Grout” per ASTM C476 for filling 3 inches spaces or larger in both horizontal directions.
4. Place grout by pumping into grout spaces unless alternate methods are acceptable to the Architect and Engineer.
5. Rod or Vibrate each grout lift during pouring operation, and again after excess moisture has been absorbed, but before plasticity is lost.
6. Limit grout pours to sections which can be completed in one working day with not more than one hour interruption of pouring operation.
7. Place grout in lintels or beams over openings in one continuous pour.
8. Where bond beams occur more than one course below top of pour, fill bond beam during construction of masonry.

B. Preparation of Grout Spaces:

1. Prior to grouting, inspect and clean grout spaces. Remove dust, dirt, mortar droppings, loose pieces of masonry and other foreign materials from grout spaces. Clean reinforcing and adjust to proper position. Clean top surface of structural members supporting masonry to ensure bond.
2. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist displacement of masonry units and breaking of mortar bond, 3 days minimum. Install shores and bracing, if required, before starting grouting operations.
3. High-Lift Grouting: After final cleaning and inspection, close cleanout holes and brace closures to resist grout pressures.

C. Grouting Technique: Use grouting techniques subject to requirements which follow.

1. High-Lift Grouting:

   a. Do not use high-lift grouting technique for grouting of CMU unless minimum cavity dimension is 3 inches and area is 12 sq. in.
   b. Provide cleanout holes in first course at all vertical cells which are to be filled with grout.
      1) Use units with one face shell removed and provide temporary supports for units above, or use header units with concrete brick supports, or cut openings in one face shell (preferred alternate). Minimum cleanout size shall be 3 inches x 4 inches. Locate cleanouts in areas not exposed to view in finished structure.
   c. Construct masonry to full height of maximum grout pour specified, prior to placing grout.
      1) Limit grout lifts to a maximum height of 4 feet -8 inches and grout pour to a maximum height 24 feet, for single wythe hollow concrete masonry walls, unless otherwise indicated.
   d. Place vertical reinforcement before grouting. Place before or after laying masonry units, as required by job conditions. The vertical reinforcement to dowels at base of masonry where shown and thread CMU over or around reinforcement. Support vertical reinforcement at intervals not exceeding 192 bar diameters nor 10 feet.
      1) Where individual bars are placed after laying masonry, place wire loops extending into cells as masonry is laid and loosen before mortar sets. After insertion of reinforcement bar, pull loops and bar to proper position and tie free ends.
      2) Where reinforcement is prefabricated into caged units before placing, fabricate units with vertical reinforcement bars and lateral ties of the size and spacing indicated.
   e. Allow not less than 30 minutes, nor more than one hour between lifts of a given pour.
   f. Rod or Vibrate each grout lift during pouring operation, and again after excess moisture has been absorbed, but before plasticity is lost.
   g. Do not penetrate or damage grout placed in previous lifts or pours.

2. Low-Lift Grouting:

   a. Construct masonry to height of maximum grout lift specified, prior to placing grout.
      1) Limit grout lifts to a maximum height of 4 feet - 8 inches, unless otherwise indicated.
   b. Clean debris and mortar droppings out of cells prior to installing reinforcing.
   c. Place vertical reinforcement before grouting. Tie vertical reinforcement to dowels at base of masonry where shown and thread CMU over or around reinforcement. Support vertical reinforcement at intervals not exceeding 4 feet - 8 inches in one grout lift.
   d. Rod or Vibrate each grout lift during pouring operation, and again after excess moisture has been absorbed, but before plasticity is lost.

3. Place horizontal beam reinforcement as the masonry units are laid.
4. Embed lateral tie reinforcement in mortar joints where indicated. Place reinforcement at vertical spacing shown as masonry units are laid.

   a. Where lateral ties are shown in contact with vertical reinforcement bars, embed additional lateral tie reinforcement in mortar joints. Place as shown, or if not shown, provide as required to prevent grout blowout or rupture of CMU face shells, but provide not less than No. 2 bars or 8-gage wire ties spaced 16” o.c. for

members with 20” or less side dimensions, and 8” o.c. for members with side dimensions exceeding 20”.

5. Preparation of Grout Spaces: Prior to grouting, inspect and clean grout spaces. Remove dust, dirt, mortar droppings, loose pieces of masonry and other foreign materials from grout spaces. Clean reinforcing and adjust to proper position. Clean top surface of structural members supporting masonry to ensure bond.

    a. High-Lift Grouting: After final cleaning and inspection, close cleanout holes and brace closures to resist grout pressures.

6. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist displacement of masonry units and breaking of mortar bond, 3 days minimum. Install shores and bracing, if required, before starting grouting operations.
7. Place grout by pumping into grout spaces unless alternate methods are acceptable to the Architect and Engineer.
8. Limit grout pours to sections which can be completed in one working day with not more than one hour interruption of pouring operation. Place grout in lifts which do not exceed 4’-8”. Place grout in lintels or beams over openings in one continuous pour.

    a. High-Lift Grouting: Allow not less than 30 minutes, nor more than one hour between lifts of a given pour. Rod or Vibrate each grout lift during pouring operation, and again after excess moisture has been absorbed, but before plasticity is lost. Do not damage grout placed in previous lifts or pours.
    b. Low-Lifting Grouting: Rod or Vibrate each grout lift during pouring operation, and again after excess moisture has been absorbed, but before plasticity is lost.

9. Where bond beams occur more than one course below top of pour, fill bond beam during construction of masonry

3.6 POINTING

A. Point-up all joints at corners, openings and adjacent work to provide a neat, uniform appearance, properly prepared for application of caulking or sealant compounds.

3.7 TOLERANCES

A. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

B. Maximum Variation from Level Coursing: 1/8 inch in 5 feet and 1/4 inch in 10 feet; 1/2 inch in 30 feet.

3.8 CONTROL AND EXPANSION JOINTS

A. Locate all CMU control and expansion joints per the Drawings.

B. Do not continue horizontal joint reinforcement through control and expansion joints.

C. Install preformed control joint device in continuous lengths as shown in the Drawings.

    1. Seal butt and corner joints.
    2. Size control joint in accordance with Section 07 90 00 for sealant performance.

3.9 BUILT-IN WORK

A. As work progresses, install all built-in components, bearing plates, and anchors furnished by other sections.

B. Electrical boxes and any other items that are built into exposed masonry shall be flush with face of wall.

1. Maximum recess for any built in item is 1/8 inch.
2. No protrusion from face of wall shall be allowed.
3. Maximum clearance between masonry and built in item shall be ¼ inch.

3.10 REPAIR AND REMEDIATION

A. In the event of damage, immediately make all repairs and replacement necessary to the approval of the Architect and at no additional cost to the Owner.

1. Remove and replace masonry units which are loose, chipped, broken, stained, or otherwise damaged, or if units do not match adjoining units as intended.
2. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement. During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar.

B. Any concrete masonry construct that the Architect or Engineer deems to be in non-conformance to the requirements of this and all related Specification Sections shall be subject to demolition and reconstruction in conformance to the Specifications to the extent defined Architect or Engineer.

1. Any and all remedial work to resolve any non-conformance or deficiency will be wholly at Contractor's expense.

3.11 CLEANING AND PROTECTION

A. Concrete scum and grout stains shall be removed immediately. After the concrete masonry assembly is constructed, it shall not be saturated with water for curing or any other purpose.

3.12 MOISTURE AND AIR BARRIERS

A. Prior to applying any moisture and/or air barrier on concrete masonry, fill all voids, pits and depressions greater than 1/8 inch deep measured from the CMU face surface with Spec compliant mortar. In addition, remove any debris, unused form fasteners, or excess mortar and patch as required.

1. Resultant surface shall be continuous, smooth, and free of debris to permit undisturbed sheeting of moisture over the subsequently installed moisture membrane.
2. Mortar shall not be used as a filling material after the moisture/air membrane is installed.

B. See Division 7 for moisture and air membrane materials and installation requirements.

END OF SECTION

SECTION 05 12 00 - STRUCTURAL STEEL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. AESS Requirements
2. Structural shapes.
3. Channels and angles.
4. Hollow structural sections.
5. Structural pipe.
6. Structural plates and bars.
7. Bolts, connectors, and anchors.
8. Temporary Bracing
9. Permanent Bracing
10. Grout.

B. Related Sections:

1.	Cast-In-Place Concrete	Section 03 30 00
2.	Non-Metallic Grout	Section 03 60 30
3.	Steel Joists and Joist Girders	Section 05 22 00
4.	Steel Roof Deck	Section 05 33 00
5.	Painting and Coating	Section 09 90 00

C. The general provisions of the Contract, including General Conditions, Supplementary Conditions, Special Conditions (if any) along with the General Requirements, apply to the work specified in this section.

D. Examine all Drawings and all other Sections of the Specifications for requirement therein affecting the work of this trade.

1.2 DEFINITIONS

A. SER: Structural Engineer of Record for the project.

B. Contractor: General Contractor. Also refers to Construction Manager when this form of construction is utilized on the project.

C. Sub-contractor: Provides materials or services for the project through the Contractor.

D. Delegated Engineer: Also referred to as Specialty Engineer, is a Florida professional engineer who undertakes a specialty service and provides services or creative work (delegated engineering document) regarding a portion of the engineering project. The delegated engineer is the engineer of record for that portion of the engineering project. Refer to Chapter 61G15-30 Responsibility Rules Common to All Engineers, Board of Professional Engineers, Florida Administrative Code, for additional information.

E. Architecturally Exposed Structural Steel: Structural steel designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents.

F. Category 2 AESS: AESS that is within 20 feet vertically and horizontally of a walking surface and is visible to a person standing on that walking surface or is designated as "Category 2 architecturally exposed structural steel" or "AESS-2" in the Contract Documents.

1.3 SUBMITTALS

A. General:

1. Submit all documents and samples in conformance to Specification Section 01 33 00.
2. Electronic submittals are required and printed copies are not acceptable unless specifically allowed by contract with the Owner.
3. Review of shop drawings does not constitute authorization to vary from the contract documents.
4. Submittal Scheduling: The Contractor shall be responsible for scheduling submittals with ample time allotted for the review process and possible resubmittals.

B. Shop Drawings:

1. Submit complete fabrication and erection shop drawings, including details of each piece (show match marks on both erection and detail drawings, and fabricated member) indicating principal lines of connection pieces.

    a. Electronic submittal is required and file format utilizing PDF format is preferred.
    b. Drawings shall be clearly marked “FOR APPROVAL ONLY – NOT FOR FIELD USE”. If drawings are not approved but are returned for corrections, the approval copies shall be resubmitted. After initial review has been made, final drawings shall be resubmitted, with all corrections made, for final review, stamped “FOR FIELD USE”.
    c. Indicate welds by standard AWS symbols and show size, length and type of each weld. Seat angles are not to interfere with architectural clearances.
    d. Acceptance will be for size, and for arrangement of principal and auxiliary members.
    e. Verify necessary dimensions at the project site and be responsible for dimensional correctness and accurately fitting work of this Section.
    f. Prepare any deviation from design drawings under supervision of a professional engineer, registered in the State of Florida, acting as the manufacturer’s Delegated engineer, who shall sign and seal these calculations and submit them with the relevant shop drawings per the statutes of the State of Florida. All computer-generated calculations and drawings shall be prepared and sealed by a Professional Engineer, licensed in the State of Florida. Refer to Section 01 33 00 for method of handling the submission of signed and sealed documents

2. Computer drawing files are available for use in the production of shop drawings if allowed by the Architect. Requirements include disclaimer provided by the Engineer which is to be accepted and signed by the Contractor as well as the sub-contractor requesting the files.
3. Connection Designs:

    a. Shop drawings submitted without required connection designs will be rejected.
    b. Bolted and welded connections shall be designed in accordance with referenced standards and specifications.
    c. Unless noted otherwise, connections shall be designed for a minimum of one-half the total uniform load capacity shown on the tables of Uniform Load Constants, Part 2 of the AISC Manual, for the given beam, span, and grade of steel specified.

d. Connection designs must conform to AISC publication “Engineering for Steel Construction”.
e. Connection designs not specifically detailed on the drawings shall be designed by a Florida Registered Structural Engineer who shall be the manufacturer’s Delegated Engineer. Signed and sealed calculations and drawings are required and shall be submitted for Architect’s records. Structural steel shop drawings will be rejected unless the required calculations are included. Manufacturer’s Delegated Engineer shall comply with Statutes of the State of Florida.

4. Templates: Furnish for setting anchors and anchor bolts together with instructions.
5. Indicate exposed surfaces and edges and surface preparation being used paying close attention for all AESS members.
6. Indicate special tolerances and erection requirements.
7. Erection Procedure: Accompany shop drawings with description of detailed procedure including sequence of erection and temporary staying and bracing.

C. Product Data:

1. Submit manufacturer’s specifications and installation instructions for the following products.

a. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties of steel supplied.
b. High strength bolts (each type), including nuts and washers. Include direct tension indicators if used.
c. Structural steel primer paint.
d. Non-shrink grout.

D. Test Reports:

1. Submit laboratory test reports and other data to show compliance with specifications (including specified standards).
2. Submit test reports conducted on shop and field bolted and welded connections.
3. Include data on type(s) of tests conducted and test results.

E. Fabricator & Installer’s Certifications:

1. Submit documentation demonstrating that Fabricator and Erector each have a minimum of five (5) years of experience in fabricating or erection of structural steel and has produced three (3) projects of similar scope.
2. Welder’s Certificate: Submit current welders’ certifications for review prior to commencing any welding.

a. Copy of approved welders’ certifications shall remain on the job-site at all times up to Substantial Completion.

1.4 QUALITY ASSURANCE

A. Applicable Codes: Specifications and Standards: Comply with provisions of the following codes, specifications and standards, except where more stringent requirements are shown or specified. All codes, specifications and standards referred to shall be latest editions:

1. American Institute of Steel Construction (AISC):

a. Manual of Steel Construction

b. Code of Standard Practice for Steel Buildings and Bridges.
c. Engineering for Steel Construction.

2. American Welding Society (AWS): Structural Welding Code, D-1.1.
3. Research Council on Structural Connections of the Engineering Foundation: Specification for Structural Joints Using ASTM-A325 or A-490 Bolts.

B. Qualification of Welders:

1. All welding shall be done by currently qualified welders.
2. Qualification and duration of qualification shall be in accordance with the requirements of the latest editions of ASW D1.1 – Structural Steel Welding Code, Steel and AWS D1.3 – Structural Steel Welding Code, Sheet Steel.

C. Quality Control: Refer to AISC, Section M5 and AISC Code of Standard Practice, Section 8, with additions noted below.

1. Inspection: The Contractor shall employ at his expense a qualified Independent Testing Laboratory, approved by the Architect and Engineer, to provide inspection of all connections, and to verify conformance to applicable codes and standards.

   a. When test results or inspections indicate apparent failure to meet specification requirements, orally report such deficiency to Architect, Structural Engineer, and General Contractor, and follow with a written report (copies to each). Prepare written reports and issue within two days after results are obtained.
   b. Identify specific location to which report pertains. Distribute copies to Architect, Structural Engineer, and General Contractor.

2. Shop Inspections: Periodic and timely inspections of steel fabricator's facilities shall include but not be limited to the following:

   a. Qualification of Welders.
   b. Welding Procedures and Testing Specified.
   c. Proper Cleaning of Steel Prior to Galvanization.
   d. Conformance to shop drawings concerning member sizes, connection assemblies, fabrication procedures.
   e. The number of shop inspections shall be adequate to assure conformance. These inspections shall be performed by the qualified testing laboratory personnel (AWS certified) at critical times to verify shop fabrication is in conformance with contract documents.

3. Field Inspections: Periodic, timely inspections of steel erection at job site shall be made. They shall include, but not be limited to the following:

   a. Inspection of field connections to verify conformance with design and applicable codes. This shall be done as required to inspect connections prior to being covered by any subsequent work. Perform once per week during erection, minimum.
   b. Establish and recheck a job bolt torque for calibration of impact wrenches in conformance with referenced standards. This shall be done at least once per week during general steel erection.
   c. High Strength Bolts: Visually observe nut rotation as indicated by match marks and "peaning" of nut corners due to impact wrench for all bolts. Spot check 10 percent of bolts for proper tension by use of a calibrated torque wrench. Check all high strength anchor bolts using calibrated torque wrench.
   d. Inspection and marking of field welds, welder qualifications and procedures.

e. Fillet Welds: Inspect and check by visual observation and physical measurements.
f. Full Penetration Welds: Visual check and ultrasonic inspection of 100% per AWS Code, Division 6, Part C.

D. Source Quality Control:

1. General: Materials and fabrication procedures are subject to inspection and tests in mill, shop and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements. Promptly remove and replace materials or fabricated components that do not comply.
2. Design of Members and Connections: Details shown are typical. Similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work. Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated.

E. Delivery, Storage and Handling:

1. Deliver materials to site at such intervals to insure uninterrupted progress of work. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time not to delay work.
2. Store materials on platforms, skids or other supports above the ground and so position as to minimize water-holding pockets. Keep free from dirt, grease and other foreign matter, and protect from corrosion. Provide easy access for inspection and identification.
3. Exercise care to maintain members in undamaged condition. Handle and temporarily brace members in such manner as to prevent damage to work or creation of hazards to workmen or public. During erection, tie or brace the building frame to resist erection and wind forces.

F. Fabricator's Qualifications: Fabricator shall have a minimum of five (5) years' experience in fabricating structural steel and having facilities and personnel adequate to have successfully produced three (3) projects of similar scope.

G. Erector Qualifications: Erector shall have a minimum of five (5) years' experience in erecting structural steel and have equipment and personnel who have successfully erected three (3) projects of similar size and complexity.

PART 2 PRODUCTS

2.1 STRUCTURAL STEEL

A. Structural Steel Components:

1. Minimum recycled steel content shall be 80%.
2. Hot-rolled Shapes: ASTM A992, Grade 50.
3. Cold Formed Steel Tubing: ASTM A500, Grade B.
4. Steel Pipes: ASTM A53, Type E or S, Grade B.
5. Plates, Angles, Channels: ASTM A36.

B. Welding Electrodes:

1. AWS D1.1.
2. Shield Metal Arc: AWS A5.1.
3. Submerged Arc: AWS A5.17.

C. Bolts and Nuts:

1. Length sufficient to extend entirely through but no more than quarter (1/4) inch beyond nuts. Bolts which transmit shear shall be threaded to such length that no more than one thread will be within the grip of the metal.
2. High Strength Bolts: Use unless noted otherwise ASTM A-325X, Bearing Type with threads excluded from shear plane.
3. Anchor Bolts: Threaded F1554, Grade 36 or 55 rod, refer to structural drawings.
4. Machine Bolts: ASTM A-307 - , 60,000 psi Tensile Strength, Grade A, and ANSI #A-18.2. Hex head unfinished bolts with hex nuts.
5. Concrete Inserts: Refer to Section 033000.
6. Nuts: ASTM A563, Grade A, and Style as specified in the applicable ASTM bolt standard.

D. Washers:

1. Plain: ANSI #B-18.22; ASTM F844.
2. Hardened: ASTM #F-436; ASTM F436 beveled as required.
3. Load Indicator Washers:
4. Galvanized: ASTM B695, Class 50, Type 1 – Use where steel is galvanized.

E. Primer & Paint:

1. Primer: SSPC-PS Guide 7.00, or approved equal.
2. Galvanizing Repair: 85-per cent zinc dust content in organic resin. ASTM A780.
3. Primer for AESS: Comply with Section 09 90 00 – Painting and Coating.
4. Refer to Division 9 of these specifications for painting requirements.

F. Non-Metallic Shrinkage Resistant Grout: Premixed, non-metallic, non-corrosive, non-staining product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with CE-CRD-C621.
1. Refer to Section 03 60 30.
2. Refer to Section 05 12 00 3.4 B.1 for grout testing requirements.

2.2 FABRICATION

A. Fabricator: Project steel Fabricator shall meet all qualification requirements established in the Quality Assurance section of this Specification.

B. Fabrication:

1. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate in accordance with referenced standards and reviewed shop drawings. Fabricate items of structural steel in accordance with AISC specifications and as indicated on final shop drawings. Provide camber in structural members where indicated. Properly mark and match mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs and other defects.
2. Connections: Shop connections shall be standard connections developing full strength of members, except as otherwise specifically indicated on drawings. Mill abutting section in compression. Punch, drill, tap and ream holes as necessary for attachment of materials of other trades. Weld shop connections; field weld only where indicated. Drill holes in base or bearing plates. Punch, drill, or cut (do not burn) holes at right angle to the

surface of the metal and one-sixteenth (1/16) inch larger than the diameter of the bolt. Provide clean-cut holes without torn or ragged edges. Remove outside burrs resulting from drilling or reaming.

3. Correction of Work: Where items will remain exposed to view in the finished work, mispunched holes shall be plugged, welded and ground flush; repair notches or gouges by completing filling with weld metal, using procedures appropriate to the condition. Obtain Architect's prior approval of repair procedure and final approval of repaired section.
4. Fastenings: Furnish specified bolts and nuts for anchoring steel to steel, concrete, brace rods, connections, and ties. ¾" diameter, minimum, unless noted otherwise.
5. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members as shown on final shop drawings. Provide threaded nuts welded to framing and other specialty items as indicated to receive other work. Cut, drill or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.
6. AESS Requirements:

    a. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.
    b. In addition to special care used to handle and fabricate AESS, comply with the following:
        1) Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
        2) Grind sheared, punched, and flame-cut edges of all Categories of AESS to remove burrs and provide smooth surfaces and edges.
        3) Fabricate all categories of AESS with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identification.
        4) Fabricate all categories of AESS with exposed surfaces free of seams to maximum extent possible.
        5) Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
        6) Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
        7) Fabricate all categories of AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
        8) Fabricate all categories of AESS to the tolerances specified in AISC 303 for steel that is not designated AESS.
        9) Seal-weld open ends of hollow structural sections with 3/8-inch closure plates for all categories of AESS.
    c. Coping, Blocking, and Joint Gaps: Maintain uniform gaps of 1/8 inch with a tolerance of 1/32 inch for all categories of AESS.
    d. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
    e. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
        1) Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
        2) Baseplate Holes: Cut, drill, or punch holes perpendicular to steel surfaces.
        3) Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.3 SHOP PAINTING/TREATMENTS

A. General: Shop paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel that is partially exposed on exposed

portions and initial 2 inches of embedded areas only. Do not paint surfaces to be welded or high strength bolted with friction-type connections. Apply 2 coats of paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

B. Painting: Provide a one coat, shop applied paint system complying with Steel Structures Painting Council (SSPC) Paint System Guide No. 7.00 and as specified in this section.

C. Surface Preparation:

1. Power Tool Clean surfaces to be painted which will not remain exposed by removing oil, grease, loose mill scale and rust, and foreign matter to the degree illustrated by SSPC-3; one-half (1/2) mil profile.
2. Commercial Blast Clean, to the degree indicated by SSPC-6, surfaces that will remain exposed to view. Apply shop paint the same day as steel is cleaned.

D. Painting: Apply 2.5-mil thick dry film of shop paint, worked well into joints. Finish surface smooth and uniform without voids or runs. Permit drying before handling.

E. Galvanize all items exposed to weather or which are located outside building exterior wall lines. Prepare members in accordance with ASTM A-385 and apply in accordance with ASTM A-386 to deposit 1.25-oz. per square foot of surface per ASTM A-123. Finished surfaces shall be free of bare spots, stalactites, and inclusions of flux or ash.

F. Marking: Mark each piece legibly in a protected location to correspond with match marks on reviewed shop drawings.

G. For AESS, Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."

H. For AESS Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

PART 3 EXECUTION

3.1 CONDITION OF PRECEDING WORK

A. Erector: Project steel Erector shall meet all qualification requirements established in the Quality Assurance section of this Specification.

B. Prior to commencing erection, inspect condition of prior work where connections will be made thereto. Report to Contractor, in writing, any condition that is unacceptable. Do not commence erection until unacceptable condition has been corrected. Commending erection will be held as acceptance of conditions.

3.2 EXAMINATION FOR AESS

A. Verify, with steel erector present, elevations of concrete and masonry bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

B. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

1. Examine AESS for twists, kinks, warping, gouges, and other imperfections before erecting.
2. Proceed with installation only after unsatisfactory conditions have been corrected to the Architect's and Engineer's satisfaction.

3.3 WORKMANSHIP

A. Erect in accordance with AISC "Manual". After assembling the various members forming a portion of the framework, align, plumb and adjust properly before fastening, Use drift pins only to bring members together in such manner as to prevent distortion or damage of the metal. Align holes using drift pins (so bolts will not bind but may be turned readily with a wrench). Provide adequate temporary bracing necessary to hold frame plumb. Bracing is to remain in place until roof diaphragm is completed and anchored to walls.

3.4 BASE AND BEARING PLATES

A. Support on steel shims and double nuts and washers as required; align using wedges and tighten nuts.

B. Grouting: Specified in Section 03 60 30.
1. Testing: Grout shall be tested by obtaining and testing cubes per ASTM C1107 for each day's placement.

C. Trimming: Cut wedges and shims off flush with edges of plates and leave in place.

3.5 CUTTING

A. Use of a cutting torch for correction of fabrication errors will not be permitted on any essential member of the structural frame; its use will be allowed on minor members, while not under stress, only after such use is specifically authorized in each case by the Engineer. Do not burn field holes; drill and ream.

3.6 CONNECTIONS

A. Bolting:

1. Refer to Research Council on Structural Connections "Specification for Structural Joints using ASTM A325 or A490 Bolts". Hereafter referred to as "H.S. Bolt Spec.".
2. Use high tensile strength bolts and nuts for field connections of primary members (columns, beams, trusses, etc.) and machine bolts and nuts for secondary members and miscellaneous steel. Do not reuse bolts.

3. Where structural joints are made using high strength bolts, hardened washers and nuts, the materials, methods of installation, tension control, type of wrenches to be used and inspection methods shall conform to referenced Specification. High strength connections shall have hardened washers at each assembly of size as specified by ASTM for size of bolt used. Place washer under element (nut or head) which will be turned by the power wrench and under bolt elements in a slotted connection. Insert bolts into holes so heads will be toward decking and/or finish, except in places where clearance is generous (so projection of nuts and overrun of bolts present no problem).

B. Handling and Storage of Fasteners: Refer to H.S. Bolt Spec. Subsection 8(a).

C. Bearing Type Connections shall comply with H.S. Bolt Spec. Subsection 8(a) of the referenced specification. These shall be visually inspected by the Independent Testing Laboratory.

D. Welded: Provide AWS D1.1 qualified welders, welding operators, and tackers. Field weld only where indicated. Welding procedure shall be such as to minimize distortion and stress concentration and to produce connection of required strength.

1. Surfaces within two inches of any field welded location shall be wire brushed before welding to reduce the shop paint film to a minimum.

E. Connection Design:

1. Refer to Paragraph 1.3 – Submittals.

3.7 PREPARATION FOR AESS

A. Provide temporary shores, guys, braces, and other supports during erection to keep AESS secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

1. If possible, locate welded tabs for attaching temporary bracing and safety cabling where they will be concealed from view in the completed Work.
2. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.8 ERECTION OF AESS

A. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

1. Erect all AESS to the tolerances specified in AISC 303 for steel that is designated AESS.

B. Do not use thermal cutting during erection.

3.9 FIELD CONNECTIONS OF AESS

1. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

a. Joint Type: Snug tightened

b. Orient bolt heads as indicated on Drawings or as directed by Architect.

2. Weld Connections: Comply with requirements in "Weld Connections" Paragraph in "Shop Connections" Article.

3.10 FIELD PAINTING

A. After assembly and testing, clean unprimed areas at connections, markings, welds and bolts free of rust and loose mill scale. Then touch-up these areas, bolts and burned, scratched or abraded shop coat with specified shop paint. Touch-up galvanized surfaces applying zinc-rich organic coating 2.5 mils thick. Refer to Division 9 for painting of exposed steel.

3.11 FIELD QUALITY CONTROL

A. Bolted Connections: Inspect in accordance with AISC 303.

1. Visually inspect all bolted connections.
2. For Direct Tension Indicators, comply with requirements of ASTM F959. Verify that gaps are less than gaps specified in Table 2.

B. Welding:

1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
2. Visually inspect all welds.
3. Ultrasonic Inspection: ASTM E164; perform on all full penetration welds.

C. Correct all defective bolted connections and welds.

D. Architect will observe AESS in place to determine acceptability relating to aesthetic effect.

END OF SECTION

SECTION 05 22 00 - STEEL JOISTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. K-series steel joists.
2. Joist accessories.

B. Related Sections:

1.	Cast-In-Place Concrete	Section 03 30 00
2.	Reinforced Unit Masonry	Section 04 23 00
3.	Structural Steel	Section 05 12 00
4.	Steel Roof Deck	Section 05 33 00

C. The general provisions of the Contract, including General Conditions, Supplementary Conditions, and Special Conditions (if any) along with the General Requirements, apply to the work specified in this section.

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

1.2 DEFINITIONS

A. SER: Structural Engineer of Record for the project.

B. Contractor: General Contractor. Also refers to Construction Manager when this form of construction is utilized on the project.

C. Sub-contractor: Provides materials or services for the project through the Contractor.

D. SJI's "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."

E. Joists: Includes Joist Girders when the term “Joist” is used generically in this specification.

F. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support non-uniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.3 SUBMITTALS

A. General:

1. Submit all documents in conformance to Specification Section 01 33 00.
2. Electronic submittals are required and printed copies are not acceptable unless specifically allowed by contract with the Owner.

3. Review of shop drawings does not constitute authorization to vary from the contract documents.
4. Submittal Scheduling: The Contractor shall be responsible for scheduling submittals with ample time allotted for the review process and possible resubmittals.

B. Shop Drawings:

1. Submit complete fabrication and erection shop drawings, including details of each piece (show match marks on both erection and detail drawings, and fabricated member).

a. Electronic submittal is required and file format utilizing PDF format is preferred.
b. Drawings shall be clearly marked “FOR APPROVAL ONLY – NOT FOR FIELD USE”. If drawings are not approved but are returned for corrections, the approval copies shall be resubmitted. After initial review has been made, final drawings shall be resubmitted, with all corrections made, for final review, stamped “FOR FIELD USE”.
c. Indicate welds by standard AWS symbols and show size, length and type of each weld.
d. Verify necessary dimensions at the project site and be responsible for dimensional correctness and accurately fitting work of this Section.

C. Computer drawing files are available for use in the production of shop drawings if allowed by the Architect. Requirements include disclaimer provided by the Engineer and which is to be accepted and signed by the Contractor as well as the sub-contractor requesting the files.

D. Qualification Data: For manufacturer.

E. Welding certificates.

F. Manufacturer certificates.

G. Mill Certificates: For each type of bolt.

H. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparation registered in the State of Florida.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications.

1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements. All computer-generated calculations and drawings shall be prepared and sealed by a Professional Engineer, licensed in the State of Florida. Refer to Section 01 33 00 for method of handling the submission of signed and sealed documents.

B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1 "Structural Welding Code - Steel."

C. Steel Testing Service:

1. The Contractor shall employ, at his expense, a qualified Independent Engineering Testing Laboratory, approved by Architect and Engineer, to perform weld quality review during construction.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

B. Deliver to site in a dry, undamaged condition.

C. Store out of contact with the ground in an upright position, under a weathertight cover permitting good circulation of air.

D. Use fabric or coated slings to minimize paint damage in handling.

E. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

PART 2 PRODUCTS

2.1 GENERAL

A. Joists shall be manufactured by a member of the Steel Joist Institute, with a satisfactory record of at least 5 years in the design and manufacture of the types of joists covered in this specification. All work shall be performed in a modern fabricating shop equipped to properly handle such work.

2.2 PERFORMANCE REQUIREMENTS

A. Applicable Codes and Standards: Comply with provisions of the following codes, specifications and standards, except where more stringent requirements are shown or specified. All codes, specifications and standards referred to shall be latest editions:

1. Steel Joist Institute (S.J.I.): “Standard Specifications, for Open Web Steel Joists, K-Series.”
2. Steel Joist Institute (S.J.I.): “Standard Specifications for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series.”
3. American Institute of Steel Construction (AISC): “Manual of Steel Construction”.
4. American Welding Society (AWS): Standard Qualification Procedure – D1.1, Section #5. Structural Welding Code – D1.1.
5. Steel Structures Painting Council (SSPC).

B. Structural Performance: Provide special joists, joist girders and connections capable of withstanding design loads indicated.

1. Use ASD: data is provided at service-load level unless noted otherwise on the drawings.
2. Design special joists to withstand design loads with live-load deflections no greater than the following:

   a. Roof Joists: Maximum Total Vertical Deflection of 1/240 of the span.

C. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 60 percent.

2.3 K-SERIES STEEL JOISTS

A. Manufacture steel joists of type indicated according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.

   1. Joist Type: K-series steel joists.

B. Provide holes in chord members for connecting and securing other construction to joists.

C. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications."

D. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."

E. Camber joists according to SJI's "Specifications."

F. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

2.4 PRIMERS

A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

2.5 JOIST ACCESSORIES

A. Bridging: Schematically indicated. Detail and fabricate according to SJI's "Specifications Furnish additional erection bridging if required for stability.

B. Furnish ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch of finished wall surface unless otherwise indicated.

C. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A, carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.

   1. Finish: Hot-dip zinc coating, ASTM A 153 Class C.

D. High-Strength Bolts, Nuts, and Washers: ASTM A , Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

   1. Finish: Hot-dip zinc coating, ASTM A 153 Class C.

E. Welding Electrodes: Comply with AWS standards.

F. Galvanizing Repair Paint: ASTM A 780.

G. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

2.6 CLEANING AND SHOP PAINTING

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by power-tool cleaning, SSPC-SP 3.

B. Do not prime paint joists and accessories to receive sprayed fire-resistive materials.

C. Apply one coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.

PART 3 EXECUTION

3.1 DAMAGED JOISTS

A. Joists damaged so as to affect their structural properties or appearance will be rejected. Special care shall be taken when welding to top chords so as not to reduce top chord area as a result of holes blown thru top chords when welding. Field repairs may be allowed only by the special permission of the Engineer and Architect, providing repair procedures have been approved by the joist supplier's engineer.

3.2 CONDITION OF PRECEDING WORK

A. Before commencing erection, inspect condition of prior work that is relative to this section. Report to the Contractor, in writing, any condition that is unacceptable. Do not commence erection of joists until condition is corrected.

3.3 ERECTION

A. Erection shall be done by a qualified erector using experienced personnel and suitable and adequate equipment. Erect in accordance with AISC Manual and S.J.I. Specification. Care shall be exercised at all times in handling and placing joists. All joists shall be aligned, plumb and permanently anchored and all bridging and bracing in place prior to receiving any structural load. See details on drawings. Comply with all requirements of OSHA.

3.4 EXAMINATION

A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.5 BRIDGING

A. Bridging shall comply with S.J.I. "Standard Specifications". Attach bridging anchors in walls to concrete members with drilled-in inserts, or as detailed. These inserts shall not be drilled until

joists are seated so that camber and deflection at joists can be considered in their locations. See details on structural drawings.

3.6 INSTALLATION

A. Do not install joists until supporting construction is in place and secured.

B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.

1. Before installation, splice joists delivered to Project site in more than one piece.
2. Space, adjust, and align joists accurately in location before permanently fastening.
3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
4. Delay rigidly connecting the bottom-chord extensions to columns or supports until dead loads are applied.

C. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

D. Bolt joists to supporting steel framework using high-strength structural bolts. Comply with Research Council on Structural Connection's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.

E. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified independent testing and inspecting agency to inspect field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports.

B. Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test field welds according to AWS D1.1/D1.1M and the following procedures, as applicable:

a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: ASTM E 709.
c. Ultrasonic Testing: ASTM E 164.
d. Radiographic Testing: ASTM E 94.

C. Visually inspect bolted connections.

D. Correct deficiencies in Work that test and inspection reports have indicated are not in compliance with specified requirements.

E. Perform additional testing to determine compliance of corrected Work with specified requirements.

3.8 PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Touch-up Painting: After installation, promptly clean, prepare, and prime or re-prime field connections, rust spots, and abraded surfaces of prime-painted joists, bearing plates, abutting structural steel, and accessories.

   1. Clean and prepare surfaces by hand-tool cleaning according to SSPC-SP 2, or power-tool cleaning according to SSPC-SP 3.
   2. Apply a compatible primer of same type as primer used on adjacent surfaces.

C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, which ensure that joists and accessories are without damage or deterioration at time of Substantial Completion.

3.9 NOTIFICATION

A. Notify Architect, Engineer, and qualified Testing Lab (AWS Certified) Inspectors for inspection of completed joist installation before any decking is applied.

END OF SECTION

SECTION 05 33 00 - STEEL ROOF DECK

PART 1 GENERAL

1.1 SUMMARY

A. Section includes vented steel roof deck and accessories; framing for openings up to and including 12 inches; bearing plates and angles; closure strips; and any required miscellaneous framing for deck as may be required to provide the completed assembly.

B. Related Sections:

1.	Structural Steel	Section 05 12 00
2.	Steel Joists	Section 05 22 00

C. The general provisions of the Contract, including General Conditions, Supplementary Conditions, and Special Conditions (if any) along with the General Requirements, apply to the work specified in this section.

D. Examine all Drawings and all other Sections of the Specifications for requirement therein affecting the work of this trade.

1.2 DEFINITIONS

A. SER: Structural Engineer of Record for the project.

B. Contractor: General Contractor. Also refers to Construction Manager when this form of construction is utilized on the project.

C. Sub-contractor: Provides materials or services for the project through the Contractor.

D. Insulating Concrete: A mixture including Portland cement, pre-generated foam and vermiculite aggregate.

1.3 SUBMITTALS

A. General:

1. Submit all documents and samples in conformance to Specification Section 01 33 00.
2. Electronic submittals are required and printed copies are not acceptable unless specifically allowed by contract with the Owner.
3. Review of shop drawings does not constitute authorization to vary from the contract documents.
4. Submittal Scheduling: The Contractor shall be responsible for scheduling submittals with ample time allotted for the review process and possible resubmittals.

B. Shop Drawings:

1. Submit complete fabrication and erection shop drawings, including details of each piece (show match marks on both erection and detail drawings, and fabricated member).

a. Electronic submittal is required and file format utilizing PDF format is preferred.
b. Drawings shall be clearly marked “FOR APPROVAL ONLY – NOT FOR FIELD USE”. If drawings are not approved but are returned for corrections, the approval copies shall be resubmitted. After initial review has been made, final drawings shall be resubmitted, with all corrections made, for final review, stamped “FOR FIELD USE”.
c. Indicate welds by standard AWS symbols and show size, length and type of each weld.
d. Verify necessary dimensions at the project site and be responsible for dimensional correctness and accurately fitting work of this Section.

C. Computer drawing files are available for use in the production of shop drawings if allowed by the Architect. Requirements include disclaimer provided by the Engineer and which is to be accepted and signed by the Contractor as well as the sub-contractor requesting the files.

D. Product Data:

1. Submit deck profile characteristics and dimensions, structural properties and finishes. Include installation instructions with welding and side lap screw details and spacing.

E. Test Reports:

1. Submit laboratory test reports and other data to show compliance with specifications (including specified standards).
2. Submit test reports conducted on field welded connections.
3. Include data on type(s) of tests conducted and test results.

F. Fabricator & Installer’s Certifications:

1. Submit documentation demonstrating that Fabricator and Erector each have a minimum of five (5) years’ experience in fabricating or erection of steel roof decks and has produced three (3) projects of similar scope.
2. Welder’s Certificate: Submit current welders’ certifications for review prior to commencing any welding.

a. Copy of approved welders’ certifications shall remain on the job-site at all times up to Substantial Completion.

1.4 QUALITY ASSURANCE

A. Applicable Codes and Standards: Comply with provisions of the following codes, specifications and standards, except where more stringent requirements are shown or specified. All codes, specifications and standards referred to shall be latest editions:

1. Steel Deck Institute (SDI): Design Manual for Composite Decks, Form Decks, and Roof Decks.
2. American Iron and Steel Institute (AISI) Publication: Specification for the Design of Cold-Formed Steel Structural Members.
3. American Society for Testing and Materials (ASTM): A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
4. American Welding Society Specifications (AWS): D1.1 – Structural Welding Code – Steel; D1.3 – Structural Welding Code – Sheet Steel

B. Qualification of Welders:

1. All welding shall be done by currently qualified welders. Qualification and duration of qualification shall be in accordance with the requirements of AWS D1.1 and D1.3.

C. Steel Testing Service:

1. The Contractor shall employ, at his expense, a qualified Independent Engineering Testing Laboratory, acceptable by Architect and Engineer, to perform weld and side lap screw installation quality review, as well as overall compliance, during construction.

D. Perform Work in accordance with State of Florida standards.

E. Coordination with Roofing Systems: The Contractor shall verify that the steel roof deck conditions accommodate the requirements of the roofing system to be installed on the deck as described in Division 7 of the Project Specifications and in the Construction Drawings.

1. Provide and install vented roof decks with percentage of openings required by the lightweight insulating concrete or other roofing trade at locations where such systems are installed.
2. Where conflicts are found between the requirements of the roofing system and the steel roof deck, the Contractor shall immediately notify the Architect, in writing, with recommendations for remediation. Final and actual remediation shall be determined by the A/E.

F. Maintain one copy of each document on site.

PART 2 PRODUCTS

2.1 STEEL ROOF DECK

A. Manufacturers:

1. Vulcraft Steel Deck
2. New Millennium
3. Canam
4. Substitutions: Permitted when approved by the A/E prior to bidding

B. Sheet Steel: ASTM A653 Grade 33 Structural Quality; with G90 galvanized coating class.

C. Bearing Plates and Angles: ASTM A36 steel, unfinished Welding Materials: AWS D1.1.

D. Touch-Up Primer: 85-percent zinc dust content in organic resin, ASTM A780. Zinc chromate type.

1. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with GC-03.

E. Flute Closures: #26-ga. Steel with 1.25 oz. zinc coating or pre-molded neoprene.

F. Sidelap Fasteners:

1. #10 HWH TEK.

G. Field Touch-Up Paint:

1. 85-percent zinc dust content in organic resin. ASTM A780.

2.2 FABRICATION

A. Per Steel Deck Institute and to comply with the drawing requirements.

B. Deck Accessories: Metal closure strips cant strips and cover plates 20 gage thick galvanized sheet steel.

C. Sump Pan: 14 gage thick sheet steel.

D. Fasteners: Hardened steel, galvanized, self-tapping or direct welding.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify field conditions are acceptable and are ready to receive work.

3.2 INSTALLATION

A. Erect metal decking in accordance with Steel Deck Institute Design Manual for Composite Decks, Form Decks, Roof Decks.

B. Erect in accordance with manufacturer's recommendations, reviewed shop drawings and as specified herein. Apply deck units only over supports which are permanently anchored and properly aligned. Deck lengths shall be a minimum of three spans in length. Join ends only over supports. Decks shall be tightly held against supports when welded.

C. Damage to the decking caused before, during, or after installation of the decking which causes reduction of either the structural integrity of the deck or the architectural appearance of exposed decking shall be the basis for removal and replacement of damaged deck by the Contractor, at the Contractor's expense. Determination of replacement requirements shall be in the opinion of the project Architect or Engineer.

D. Bear decking on masonry and concrete support surfaces with 4 inch minimum bearing. Align and level.

E. Bear decking on steel supports with 2 inch minimum bearing. Align and level.

F. Fasten ribbed deck to steel support members at ends and intermediate supports with fusion welds per drawings.

G. Fastening

1. Refer to details on the drawings for requirements. Minimum anchor pattern shall be not less than one weld every 12" and 1 sidelap screw midspan unless otherwise indicated on drawings.
2. Weld in accordance with AWS D1.1.
3. Mechanically fasten male/female side laps per drawings.

H. Reinforce steel deck openings per drawing details.

I. Install 6 inch minimum wide sheet steel cover plates, of same thickness as decking or greater, where deck changes direction. Fusion weld spaced at 6 inches o.c. maximum.

J. Install sheet steel closures and angle flashings to close openings between deck and walls, columns, and openings.

K. Install single row of foam flute closures above walls and partitions perpendicular to deck flutes .

L. Position roof sump pans with flange bearing on top surface of deck. Attach at each deck flute.

M. Immediately after welding deck and other metal components in position, coat welds, weld blooms, burned areas, and damaged surface coating, with touch-up prime paint.

3.3 FIELD TOUCH-UP PAINTING

A. Clean and paint all welds on roof decks with specified touch-up paint.

3.4 NOTIFICATION

A. Notify Architect and Engineer for review of decking installation before any roofing is applied and after Steel Testing Service has completed their inspection.

3.5 FIELD QUALITY CONTROL

A. Notification: Notify Architect and Engineer for review of decking installation before any roofing is applied and after Steel Testing Service has completed their inspection

B. Welding: Inspect welds in accordance with AWS D1.1.

END OF SECTION

SECTION 05 40 00 COLD FORMED METAL FRAMING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included: Load bearing and non-load bearing cold formed mtl steel stud framing: Exterior studs such as Bid Alt 2 Walkway Canopy, and Structural Load Bearing locations (including all walls where walls 13'-6" and higher, and where studs load bearing such as associated with storefront system support, counter rolling door, and supporting overhead cabinetry and equipments, or as specifically indicated on drawings.

B. Related Work Specified Elsewhere:
1. Rough wood blocking: Section 06 10 00 – Rough Carpentry
2. Wall insulation: Section 07 21 00 – Building Insulation.
3. Steel lintels: 05 12 00 – Structural Steel
4. Storefront frames: 08 40 00 – Entrances and Storefronts
5. Automatic doors: 08 46 00 – Automatic Entrance Doors
6. Gypsum board: 09 25 00 – Gypsum Board

1.02 SYSTEM DESCRIPTION

A. Size and space components as follows and/or as required to withstand design loads. All metal studs used as backup for exterior supporting elements or load bearing elements shall be designed by a specialty engineer registered in the state of Florida with calculations submitted for review and approval.
1. Gauge: Eighteen and/or as shown on drawings.
2. Spacing: As shown on drawings.
3. Width: As shown on drawings.
4. Bridging: Four feet on center and/or as shown on drawings.

B. Maximum Allowable Deflection: 1/600 of span for brick backup otherwise 1/360.

C. Design wall systems to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.

D. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

1.03 QUALITY ASSURANCE

The Contractor is to provide cold-formed metal framing capable of withstanding loads within limits and under conditions indicated; dependent of product and system used, design of which will vary, and design of which is the responsibility of a Professional Engineer legally qualified to practice engineering for the requirements of the Florida Building Code. The specifications and drawings set forth the design intent but the Contractor is to submit the industry standard Shop Drawings indicating necessary installation specific data as specified in 1.04 D.

A. Manufacturer: Company specializing in structural framing components with 3 years minimum experience.

B. Design structural elements under direct supervision of registered professional engineer experienced in design of structural building framing members.

C. Engineering Responsibility: Engage a qualified professional engineer to prepare design calculations, Shop Drawings, and other structural data.

D. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where Project located, and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.

1.04 SUBMITTALS

A. Shop Drawings: Indicate following:
1. Location of all framing members including size and gauge.
2. Connections between members and connections to building structure, including size and number of fastenings and any required connection materials.
3. Framed openings.
4. Bracing and anchorage required for secure and stable installation.
5. Accessories or items required of other related work.

B. Manufacturer's Literature:
1. Provide product data on standard framing members.
2. Describe materials and finish, product criteria and limitations.
3. Manufacturer's installation instructions.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURER'S:

A. United States Gypsum Co.

B. Dale Industries, Inc.

C. Substitutions: Items of same function and performance by other manufacturers are acceptable as approved by Architect.

2.02 FRAMING MATERIALS

A. Studs: ASTM A446 sheet steel, formed to channel shape, punched web, galvanized.

B. Runners: Formed steel; channel shaped; same width as studs, tight fit; solid web; galvanized.

C. Roll from new sheet steel; re-rolled steel not acceptable; galvanized.

2.03 ACCESSORIES

A. Bracing, Furring and Bridging: Formed sheet steel, thickness determined for conditions encountered, manufacturer's standard shapes, same finish as framing members.

B. Plates, Gussets, Clips: Formed sheet steel, thickness determined for conditions encountered, manufacturer's standard shapes, same finish as framing members.

C. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20, Type I Inorganic, zinc rich.

2.04 FASTENERS

A. Self-Drilling, self-tapping screws, bolts, nuts and washers, hot dip galvanized.

B. Anchorage Devices: Power driven.

C. Welding: In conformance with AWS D1.1.

2.05 FINISH

A. Galvanized, G90 coating class.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify that substrate surfaces and building framing components are ready to receive work.

B. Verify that rough-in utilities are in proper location.

C. Beginning of installation means acceptance of conditions.

3.02 ERECTION OF STUDDING

A. Install components in accordance with manufacturer's instructions.

B. Align runners; locate to wall layout.

C. Secure in place with fasteners or welding at maximum 24 inches.

D. Place studs at 16 inches on center minimum, or as shown on drawings if less than 16 inches and not more than 2 inches from abutting walls and at each side of openings.

E. Connect studs to tracks using fastener method.

F. Construct corners using minimum 3 studs.

G. Double stud wall openings and door jambs.

H. Erect studs one-piece full length.

I. Splicing of studs is not permitted.

J. Coordinate placement of insulation in multiple stud spaces after erection.

K. Install intermediate studs above and below openings to align with wall stud spacing.

L. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.

M. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.

N. Touch up field welds and damaged galvanized surfaces with primer.

O. Do not cover-up work after Framing Inspection completed.

End of Section

SECTION 06 10 00 ROUGH CARPENTRY

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:
1. Light framing
2. Rough wood bucks
3. Blocking
4. Furring
5. Plywood and Particleboard

B. Related Work Specified Elsewhere:
1. Concrete forms: Section 03 30 00 - Cast-in-Place Concrete
2. Cabinets and trim: Section 06 40 00 - Millwork
3. Wood doors: Section 08 21 00 - Wood Doors
4. Painting: Section 09 90 00 - Paints and Coatings

1.02 QUALITY ASSURANCE

A. Lumber Grading Rules and Wood Species: Conform to National Bureau of Standards Voluntary Product Standard PS 20.

B. Grading rules of following associations apply to materials furnished:
1. Northeastern Lumber Manufacturer's Association, Inc. (NELMA).
2. Southern Pine Inspection Bureau (SPIB).
3. Western Wood Products Association (WWPA).

C. Plywood Grading Rules: Softwood Plywood; NBS Voluntary Product Standard PS 1.

D. Grade Marks:
1. Identify all lumber and plywood by official grade mark.
2. Lumber:
   a. Grade stamp to contain symbol of grading agency certified by National Forest Products Association (NFPA), mill number or name, grade of lumber, species or species grouping or combination designation, rules under which graded where applicable, and condition of seasoning at time of manufacture.
   b. S-GRN: Unseasoned.
   c. S-DRY: Maximum 19 percent moisture content.
   d. MC-15 or KD: Conform to PS 1.

E. Requirements of Regulatory Agency: Pressure Treated Lumber and Plywood; American Wood Preservers Bureau (AWPB), Quality Mark.

1.03 DELIVERY, STORAGE AND HANDLING

A. Store materials minimum of 6 inches above ground on framework or blocking and cover with protective waterproof covering providing adequate air circulation or ventilation.

B. Protect sheet materials from corners breaking and damaging surfaces while unloading.

PART 2 - PRODUCTS

2.01 LUMBER

A. Dimensions:
1. Specified Lumber Dimensions: Nominal.
2. Actual Dimensions: Conform to PS 20.

B. Surfacing: Surface 4 sides (S4S), unless specified otherwise.

C. Moisture Content: Unless indicated or specified otherwise, as follows:
1. Board or Framing Lumber: 19 percent.
2. Materials Other than Lumber: In accordance with standard under which product is produced.

D. Framing Lumber: Any commercial softwood species, unless otherwise specified or shown on drawings.
1. Light framing (2 inches to 4 inches thick, 2 inches to 4 inches wide):
a. General Framing: Standard Light Framing or Stud grade.
b. Plates, Blocking, Bracing, and Nailers: Utility grade.

2.02 PLYWOOD

A. Conform to PS 1.

B. Exterior graded plywood where edge or surface is permanently exposed to weather.

2.03 MISCELLANEOUS MATERIALS

A. Building Paper: Asphalt saturated felt, ASTM D 226, Type I nonperforated.

2.04 PRESERVATIVE TREATED WOOD PRODUCTS

A. Preservative Pressure Treated Lumber, Alkaline Copper Quat (ACQ): Type D, Amine Copper Quat.
1. Manufacturers:
a. Chemical Specialties, Incorporated, Charlotte, NC (800) 421-8661.
b. Arch Wood Protection, Inc., Smyrna, GA (770) 801-6600
c. Osmose Inc., Griffin, GA, (800) 241-0240
2. Products:
a. CSI: “Preserve”.
b. Arch Wood: “Natural Select”
c. Osmose: “Nature Wood”
3. Impregnate lumber with preservative treatment conforming to AWPA Standard C1 and P5. Apply the preservative in a closed cylinder by pressure process in accordance with AWPA Standard C15.
4. Retention of preservative:
a. Moderate service conditions (weather exposure): 0.25 pounds per cubic foot (oxide basis).
b. Severe conditions (constant contact with ground or water): 0.40 pounds per cubic foot (oxide basis).

5. Treatment material shall provide protection against termites and fungal decay and shall be registered for use as a wood preservative by the U. S. Environmental Protection Agency.

2.05 FASTENERS

A. Type and size necessary for project requirements unless indicated or specified otherwise.

B. Fasteners of Manufactured Materials: Size, type, and spacing as recommended by product manufacturer unless indicated or specified otherwise.

C. Exposed to weather or embedded in, or in contact with concrete or masonry: Galvanized.

PART 3 - EXECUTION

3.01 INSPECTION

Verify that surfaces to receive rough carpentry materials are prepared to required grades and dimensions.

3.02 INSTALLATION

A. Framing:
1. Anchor sills and plates to concrete structure with anchor bolts, expansion sleeves and lag bolts, or power driven fasteners, spaced 4 feet on centers.
2. Blocking: Provide solid wood blocking to facilitate installation of all finishing materials, fixtures, equipment, cabinetry, specialty items such as toilet accessories, toilet partitions and fire extinguishers, and trim, as shown on drawings and as required by manufacturer's published requirements for installation of same; provide blocking for relocated materials such as overhead cabinetry; provide blocking for Owner furnished items such as Toilet Accessories.

B. Wood Furring:
1. Provide where shown and as necessary for facing materials specified.
2. One inch by 2 inches, continuous; space 24 inches on center unless shown otherwise.
3. Erect vertically or horizontally as required or as shown on drawings.
4. Shim out from wall where necessary to maintain alignment.
5. Anchor securely to walls with power actuated fasteners, case hardened nails, or other approved fasteners.

C. Pressure Treated Wood Products:
1. Provide pressure treated wood for all framing. Blocking, furring, and nailing strips built into exterior masonry walls, wood in contact with concrete.
2. Apply 2 brush coats of same preservative used in original treatment to all sawed or cut surfaces of treated lumber.
3. Remove excess moisture where shrinkage is a serious fault or where treated lumber will be in contact with plaster, or stucco, and where water-borne treated lumber is to be painted or stained.
4. Dry lumber to 15 to 19 percent moisture content after treatment.

D. Plywood and Particleboard Sheathing and Underlayment:

1. Plywood: Comply with printed installation requirements of the APA Design/ Construction Guide, Commercial for plywood application required, unless otherwise indicated.
2. Particleboard: Install in accordance with National Particleboard Association recommendations for the type of condition, unless otherwise indicated

End of Section

SECTION 06 25 00 SLATWALL PANEL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: T-Grooved wood composite 3/4" (19mm) thick panels, pre-engineered and machined for use with [groove inserts and] retail display hardware..
   1. Attachment System:
      a. Direct fastening of slatwall to [metal stud][wood stud] [or] [furring] framing.
   2. Panels:
      a. Wood veneer laminated to wood fiber substrate having a balancing backer sheet, with protective topcoats.

B. Related Sections:
   1. Wood Trim; Section 06 40 00.
   2. Gypsum board; 09 25 00.

1.2 REFERENCES

A. American Society for Testing and Materials: Standard Specifications (ASTM)
   1. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. Architectural Woodwork Standards as published by the Architectural Woodwork Institute, the Architectural Woodwork Manufacturers Association of Canada, and the Woodwork Institute.
   1. Architectural Woodwork Standards - Edition 1.

1.3 SUBMITTALS

A. Product Data: Submit sufficient manufacturer's data to indicate compliance with these specifications, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

B. Shop Drawings: Submit elevations of each wall showing location of paneling and trim members with respect to all discontinuities in the wall elevation.

C. Selection Samples: Submit manufacturer's standard color and pattern selection samples representing manufacturer's full range of available colors and patterns.
   1. Provide samples of edge trim as applicable.
   2. Provide samples for groove insert selection as applicable.

D. Samples for Verification: Submit sample for each component and for each exposed finish required, prepared on samples of size indicated below complete with exposed molding and trim samples. Sample to indicate type, finish, and color specified.
   1. Wood Veneers: Submit sample sets of [each] wood veneer with stain color and finish required. Sample size approximately 6” (154mm) by 10” (254mm). Sample sets to show the full range of normal color and texture variations expected.

E. Manufacturers Material Safety Data Sheets (MSDS) for panels, adhesives prior to their delivery to the site.

F. Maintenance Instructions.

1.4 QUALITY ASSURANCE

A. Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with:
   1. ASTM E 84 (Method of test for surface burning characteristics of building Materials)
   2. Required Rating – Class [A.] [C.]

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver panels and associated materials factory packaged on strong pallets and properly packaged or protected.
   1. Upon delivery carefully inspect all cartons, packages, pallets and protective wrap for damage or material shortage.
   2. Open and inspect suspect packages, cartons or wrapped pallets for damage.
   3. Contact shipper immediately to report any damaged or missing materials.
   4. Contact Manufacturer immediately to report any damaged or missing materials, or with any questions, problems or concerns.

B. Store products in manufacturer's unopened packaging until ready for installation.
   1. Maintain plastic or other protective wrap in place during on site handling until ready for installation.
   2. Keep panels clean and do not stack panels after removal of protection.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.6 PROJECT CONDITIONS

A. Wood composite panels are subject to the effects of humidity and temperature. Do not store in kitchens, rest rooms, or other high humidity areas.

B. Partition walls are to be finished and the building completely closed. Walls shall be thoroughly dry and concrete cured and dry before starting installation.

C. HVAC system must be operable and installation area must be balanced to normal operating conditions.

D. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. To ensure product performance, a temperature range of 60°-80°F (16°C-27°C) and a humidity range of 35-55% must be maintained during storage, installation and product life cycle. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.7 COORDINATION AND SEQUENCING

A. Except as specified by the architect, it's recommended to locate trim members so that panel lines coordinate with doors, headers, jambs and other discontinuities in a wall.

PART 2 - PRODUCTS

2.1 ACCEPTABLE PRODUCT

A. Marlite Slatwall Panel; Marlite, 202 Harger Street, Dover, OH 44622. 800-377-1221 FAX (330) 343-4668 Email: info@marlite.com www.marlite.com.

B. Products equal in all aspects to Marlite Slatwall Panel will be considered.

2.2 PANEL

A. Panel Configuration: Engineered groove machined into wood composite substrate.
   1. Panel thickness – 3/4" thick with nominal1/2" deep slotted grove.
   2. Panel 1 face dimensions: 48" by 96" (Total of 4 required).
   3. Panel 2 face dimensions: 48" by 48" (Total of 5 Required)
   4. Slatwall panels grooves machined on 3".

B. High internal bond wood composite substrate.

   1. Standard Slatwall, NAF
      a. Medium density wood fiberboard conforming to ANSI A208.2, industrial-grade MDF and having No-Added Formaldehyde (NAF).

2.3 PANEL FINISH

A. Wood Veneer Panels: Wood veneer applied to the substrate via cold press to wood fiber substrate, and coated with furniture grade catalyzed finish.
   1. Edges: Square cut and sealed.
   2. Balancing Backer: Wood veneer measuring between 0.015" and 0.025".
   3. Veneer Face: Architectural grade rotary cut veneer. 0.035" thick Red Oak Veneer Marlite #020, as confirmed and selected by Architect from manufacturer's standard selection.

2.4 GROOVE TREATMENT AND TRIMGroove Treatment:

1. Marlite 7000 Series: Factory installed aluminum insert – [mill finished][black].

B. Panel Trim:

1. Edge – Wood Profile Marlite W770 9⁄16” x 1” x 8’-0" Poplar, for field finishing.

2.5 INSTALLATION ACCESSORIES

A. Phillips, bugle head, coarse threaded screws.

B. Marlite Rail Assembly: Combination of Mounting Track and Panel Bar

1. Steel prefinished at the factory. Silver Powder Coat

C. Adhesives:

1. Marlite Brand SS5262 Heavy Duty C-109 solvent based adhesive unless otherwise approved by Marlite.

2.6 FABRICATION

A. All framing, panels, hardware and accessories shall be factory finished and ready to install except for field fabrication required by perimeter and corner conditions.

B. Refinish field cut panel edges in accordance with manufacturer’s instruction before installation.

C. Fabrication Tolerances for panels:

1. Dimensional: ± 0.0625”
2. Square: ± 0.125” across diagonals
3. Thickness: ± 0.008”
4. Grooving:: ± 0.031” (groove width and spacing between grooves)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Installer's Examination: Examine conditions under which construction activities of this section are to be performed. Submit written notification to Architect and system manufacturer if such conditions are unacceptable. Beginning erection constitutes installer's acceptance of conditions.

1. Verify that a vapor barrier has been provided on exterior walls behind backing to prevent warping.
2. Verify backing panels are smooth, solid, and flat. All drywall joints are to be taped and finished.
3. Verify that walls are primed before installation begins.
4. Verify mechanical, electrical, and building service and/or items affecting work of this section are placed and ready to receive this work.

B. Structural walls are to be finished, with building completely closed. Walls shall be thoroughly dry before starting installation.

3.2 PREPARATION

A. Conditioning: Panels must be allowed to acclimate to a balanced environment in the installation location for 72 hours prior to installation.

B. Protect existing surfaces with drop cloths.

C. Except as directed by architect, before installing, examine panels and arrange to achieve best combination of color, pattern, texture and grain.

3.3 INSTALLATION

A. Install all materials in strict accordance with the manufacturer's installation instructions with hardware straight, plumb, and level.
   1. Anchor units rigidly and securely in place.
   2. Cut sheets to meet existing supports.

B. Fasten initial bottom panel to the wall with #6 or #7 bugle head drywall screws. Install a minimum of one screw every third slot (or 9") vertically and every stud horizontally, typically every 16" on centers horizontally (maximum 24" on centers horizontally). Each 4' x 8' panel shall have minimum of 42 screws secured to studs or furring.
   1. Where screws do not hit the studs, fasten with adhesive in accordance with the manufacturer's recommendations.
   2. Screws must be installed thru the panel grooves.
   3. Slatwall panels with inserts require 5/32" pre-drilling of holes thru the insert and panel before fastening.

C. Avoid contamination of the panel faces with adhesives, solvents or cleaners during installation.

3.4 CLEANING AND PROTECTION

A. Clean and remove dust and other foreign matter from panel and framing surfaces. Clean finishes in accordance with manufacturer's instructions.

End of Section

SECTION 06 40 00 ARCHITECTURAL WOODWORK AND MILLWORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:
1. Standing and running trim.
2. Removal, storage, and reinstallation of existing Custom Casework; see drawings for Café and Bookstore work, as well as miscellaneous Toilet Room counters.
3. Custom Casework, including cabinetry and counter tops, closet and storage shelving, and associated plastic laminate or solid surfacing material, and shelf supports, standards, brackets, additional hardware and accessories.

B. Related Work Specified Elsewhere:
1. Blocking: Section – 06 10 00 - Rough Carpentry
2. Painting and touch-up: Section 09 90 00 - Painting and Coatings.

1.02 QUALITY ASSURANCE

A. Standards:
1. “Quality Standards" of Architectural Woodwork Institute (AWI) apply and by reference are made a part of this specification.
2. Any reference to Premium, Custom, or Economy is as defined in AWI “Quality Standards”.
3. Where quality grade of any item is not specified provide Custom grade.

B. Woodwork Manufacturer shall be certified by the AWI Quality Certification Program as competent to perform the work specified, and have 5-year previous experience of successfully completed comparable work.

C. References:
1. ASTM E84 – Test Method for Surface Burning Characteristics of Building Materials.
2. AWI – Quality Standards.
3. BHMA A156.9 – Cabinet Hardware.
4. FS MMM-A-130 – Adhesive, Contact.
5. NEMA (National Electric Manufacturer’s Association) LD3 – High Pressure Decorative Laminates.
6. PS 1 – Construction and Industrial Hardwood.
7. PS 20 – American Softwood Lumber Standard

D. Lumber Grading: Lumber Grading Rules and Wood Species in accordance with Voluntary Product Standards PS 20-70. Grading rules of Southern Pine Inspection Bureau (SPIB) apply to materials furnished.

E. Fire Hazard Classification: Comply with required NFPA, ANSI and UL surface burning characteristics for plastic laminates, lumber and plywood.

1.03 SUBMITTALS

A. Shop Drawings: Submit shop drawings on all items of architectural woodwork. Include evidence of Woodwork Manufacturer’s qualifications.

B. Brochures: Submit manufacturer's descriptive literature of specialty items not manufactured by Custom Cabinetry or Millwork manufacturer.

C. Wood samples: Submit three 8” long samples illustrating expected range of component finish color and/or grain.

D. Solid surfacing material and plastic laminate samples: Submit samples of full range of available colors, textures, and patterns of solid surfacing material, plastic laminate, and if used, edge banding.

1.04 FIELD DIMENSIONS

A. Woodwork Manufacturer is responsible for details and dimensions not controlled by job conditions.

B. Design and fabricate units based upon field conditions and measurements. Verify field measurements are included in shop drawings.

C. Cooperate with Contractor to establish and maintain these field dimensions.

1.05 PRODUCT HANDLING

A. Do not deliver millwork until building and storage areas are sufficiently dry so as to avoid damage by excessive changes in moisture.

B. Deliver, store and handle millwork in manner to prevent damage and deterioration.

1.06 PRE-INSTALLATION CONFERENCE

A. Convene a pre-installation conference after site inspection and prior to commencement of this work. Discuss any items that may alter fabrications or intended installation and determine acceptable conclusions.

1.07 COORDINATION

A. Coordinate work with plumbing, mechanical, electrical, and other trades for rough-in work and installation of adjacent and associated components

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Sub-base Materials, Plywood:
   1. ¾” thick, 9-ply closed-grain hardwood plywood typical unless noted otherwise.
   2. ¼" thick hardwood plywood at cabinet backs and drawer bottoms; preformed wood fiber with smooth, hard, moisture resistant surface.
   3. Exterior grade within 4’ of any sink edge or in contact with ground.
   4. AWI Grade: Custom

B. Blocking, Edging unless otherwise noted, and Supports
   1. Solid wood, kiln dried
   2. Species, Fir or Poplar

3. AWI Grade: Custom

D. Plastic Laminate:
1. High pressure laminate, General Purpose Grade, NEMA LD3, GP-50 by Formica, Nevamar or Wilson Art.
2. Thickness:
a. 0.050 inch: Exposed horizontal surfaces
b. 0.030 inch: Exposed vertical surfaces
c. BK 20 for Cabinet and drawer linings and concealed backing: 0.020 inch, matte finish, white unless otherwise noted.

E. Edging: 1st Floor Storage-Copier-Breakroom, and 2nd Floor Copier- Breakroom to match existing in material, finish, and texture; casework at Lobby shown on drawings; otherwise PVC, 3mm thick, width to match edge thickness, color as selected by Architect from manufacturer's full range of standard colors.

F. Solid Surfacing: equal to Earthstone by Wilsonart

G. Hardware Breakroom, and Café to match existing; other:
1. Drawer slides:
a. Epoxy coated steel with nylon rollers.
b. Rated for 75 pound load
c. Self aligning, self-closing, bell bearing type.
d. Acceptable:
(1) Knape and Vogt Mfg. Co., Inc. , No. 8500.
(2) Substitutions: Items of same function and performance by other manufacturers are acceptable as approved by Architect.
2. Hinges:
a. Heavy duty.
b. Acceptable:
(1) self-closing Stanley HT1592, US28
(2) Substitutions: Items of same function and performance by other manufacturers are acceptable as approved by Architect.
3. Catches:
a. Aluminum, magnetic type.
b. Acceptable:
(1) Stanley Hardware, 41 series
(2) Substitutions: Items of same function and performance by other manufacturers are acceptable as approved by Architect.
5. Pulls: custom casework at Food Service area and Lobby as shown on drawings or if not shown, as follows:
a. Brushed stainless steel, ribbon type
b. Color: To be selected by Architect.
6. Shelf Supports (recessed in custom casework):
a. Shelf standards and supports: to match existing; custom casework at Food Service area and Lobby as shown on drawings or as follows:
(1) Aluminum, heavy duty.
(2) Acceptable:
(a) Knape and Vogt Mfg. Co., Inc. No. 255 Standards and 256 Supports.
(b) Substitutions: Items of same function and performance by other manufacturers are acceptable as approved by Architect.
7. Door Locks, casework at Lobby:

a. Material: brushed stainless steel finish
b. Keyed to the existing Facility Master Key System; master key doors and drawers of cabinetry in each room with each other and the main entrance room door.
d. Provide 2 keys for each lock.
e. Acceptable:
(1) Schlage CL 2000, US26D complete with strike plate
(2) Substitutions: Items of same function and performance by other manufacturers are acceptable as approved by Architect.

8. Silencers: Neoprene type with self-adhesive at all cabinet doors.

H. Glazing (Lobby): Provide clear, tempered glass for glazed doors and openings in cabinetwork, ¼" thick unless otherwise indicated or approved.

I. Accessories: Adhesives, concealed fasteners, nuts, bolts, screws, pins, washers, etc. of type and size to suit application and severity of use. Provide finished grommets for holes and cut-outs.

J. Miscellaneous: Provide shims, blocking, etc. as required for complete installation.

2.02 MILLWORK FABRICATION

A. Fabrication Workmanship: AWI Custom grade. See drawings for specific detailing requirements of counter, door, shelf edge, etc.

B. Pressure Treatment:
1. For materials adjacent to concrete, treat with preservative, using standard 3-minute immersion treatment.
2. Retreat all surfaces exposed by sawing, planning, or boring with a liberal brush application of same solution or by re-immersing.

C. Seal all millwork items, unless factory finish has been applied, before shipping to job site as follows:
1. Paint Finish: One coat of pigmented type sealer.
2. Transparent Finish: One coat of clear sealer.

D. Casework
1. General:
a. Plastic Laminate Tops, Panels, Door and Drawer fronts, Cabinet Shelving, and all other Exposed Surfaces: Construct of 3/4-inch exterior grade plywood (Particleboard, hardboard and flake-board are not acceptable).
b. Concealed Backs: 1/4-inch hardboard.
d. Finish:
(1) Exposed surfaces: as shown on drawings. Exposed wood veneer to receive transparent finish, plastic laminate is 0.050-inch thick.
(2) Semi-exposed Surfaces: 0.020-inch thick plastic laminate.
2. Doors and Shelving:
a. Twelve inches long or less: 1/2-inch plywood core.
b. Over twelve inches long: 3/4-inch plywood core.
c. Plastic laminate finish, both sides, unless otherwise noted for finished wood to receive transparent finish.
d. Edge: Breakroom, and Café to match existing; casework at Bookstore/Community Flex Space divider as shown on drawings.
3. Drawers:
a. Face: Three-quarter inch plywood with plastic laminate finish.

(1) To match existing.

b. Backs and Sides: One-half inch hardboard or plywood.

c. Bottom: One-quarter inch tempered hardboard.

d. Finish: Interior Surfaces: 0.020 inch thick plastic laminate cabinet liner.

4. Hardware: Fit drawer guides and cabinet-mounted shelf standards at mill. Ship other finish hardware items loose for installation at job site.

5. Counter Tops

(a) As indicated above, and on drawings.

(b) Cut holes for sinks from templates furnished by plumbing subcontractor; other cutouts to be edge finished or provide brushed stainless steel or aluminum grommet.

(c) Fabricate in one piece ready for scribing and installing.

6. Glazing: Install glazing at mill to the greatest extent practical. Field glazing shall be with dry type glazing gaskets sized to eliminate gaps and prevent loose glazing installations.

7. Construction: Construct each unit or cabinet in one section where practical, or in largest practical sections to facilitate ease of handling and installation. Cabinet constructed in more than one section, ship trim and scribe strips loose at field joints. Locate counter butt joints minimum 2' from sink cutouts.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine surfaces for conditions that would prevent quality installation of millwork. Verify that all grounds, stripping and blocking are secure and in place to support casework and millwork.

B. Do not install until all defects are corrected; doing so shall indicate acceptance of site conditions and require installer/subcontractor to correct any defects.

3.02 INSTALLATION

A. Casework including re-installation of existing casework identified above and as shown on drawings:

1. Install casework plumb and level (within 1/16” in 10’).
2. Shim as necessary with concealed shims.
3. Accurately scribe and closely fit all face plates, filler strips, and trim strips to irregularities of adjacent surfaces.
4. Securely anchor millwork to substrate with concealed fasteners and blind nailing.
5. Set nail heads, plug and finish to match surrounding finish.
6. Seal all joints around counter tops with sealant; fully bed backsplashes and end splashes to top and each other with Dow Corning #786 mildew resistant silicone sealant.
7. After installation, wipe finished surfaces to remove marks of handling and leave in perfect condition.

B. Shelving:

1. Support fixed shelves with continuous ledger at sides and back.
2. Install wall-shelving standards on solid backing or with toggle bolts into steel studs or masonry or TEK screws into concrete. Do not install wall-shelving standards into gypsum wallboard only. Space standards as required to support indicated loading but not less than 5-plf based on shelf material provided.

3.03 ADJUSTMENT AND CLEANING

A. Casework adjustment and cleaning includes re-installation of existing Casework identified above and as shown on drawings in addition to new work as shown on drawings.

B. Adjust all hardware to center doors and drawers in openings and in line with each other and provide proper operation.

C. Accurately align drawer and doors to provide even spacing and uniform appearance.

D. Repair or replace damaged or defective material.

E. Clean all exposed and semi-exposed surfaces and protect millwork from damage or deterioration until project completion.

End of Section

Project Manual

EXCERPT INCL DIVISION 22 PLUMBING

BID NUMBER – BID-SJR-06-2018

Renovation with Addition To Building V, St. Augustine Campus

2990 College Drive
St. Augustine, Florida 32084

TO BE CONSTRUCTED FOR:

ST. JOHNS RIVER STATE COLLEGE

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SECTION 22 00 00 COMMON REQUIREMENTS FOR PLUMBING WORK

PART 1 - GENERAL

1.1 SCOPE OF DIVISION

A. Work Description: Work shall include all materials, equipment and labor necessary for a complete and functioning plumbing installation in accordance with local and state codes, and contract drawings and specifications. Work shall be understood to include all work specified in DIVISION 22, PLUMBING, of the specifications.

B. Regulations, Codes, Standards and Ordinances:

1. Florida Building Code – Building, 2017 Edition.

2. Florida Building Code – Plumbing, 2017 Edition.

3. National Fire Protection Code, Life Safety Code, NFPA-101, 2015 Edition.

C. Refer to other Divisions for continuation of exterior work and allied work.

D. Obtain and pay for all required plumbing permits, fees and inspections.

1.2 DRAWINGS

A. Architectural and structural drawings take precedence over plumbing drawings with reference to the building construction. Plumbing drawings are diagrammatic and indicate the general arrangement and extent of work. Architectural drawings indicate more exactly the desired relationship between diffusers, registers, lighting fixtures, equipment, electric panels and devices, plumbing fixtures, and other items which remain exposed in the completed building.

B. Exact locations and arrangements of materials and equipment shall be determined, with the approval of the Engineer, as work progresses to conform in the best possible manner with the surroundings and with the adjoining work or other trades.

C. Where locations of equipment, devices or fixtures are controlled by architectural features, establish such locations by referring to dimensions on Architectural (A-series) drawings and not by scaling drawings.

1.3 COORDINATION OF WORK

A. Coordinate all work, prior to installation, with work of other trades and with architectural and structural features to preclude interference between the works of different trades and to insure necessary clearances at crossovers and equipment. Work requiring necessarily fixed locations (e.g.; piping with required slopes, lighting fixtures and diffusers in ceilings, etc.) takes precedence over work not requiring such fixed locations and shall establish permissible routing of services associated with the latter.

B. Should work be performed without adequate coordination so that interference occurs between works of different trades, the Contractor shall eliminate such interference by requiring necessary rework by the trades involved. Such rework shall meet express approval of the Engineer and shall be performed at no addition to contract amount.

1.4 DISCREPANCIES

A. Refer to DIVISION 01 - GENERAL REQUIREMENTS.

B. Refer all discrepancies in writing to the Engineer for resolution.

1.5 SUBMITTALS

A. Material List: Within twenty (20) days of award of contract, submit to Engineer for approval a complete list of materials to be provided for the plumbing work. The list shall include supplier's names and manufacturer's names and number or series for each item on list. Items not shown on said list shall be construed to be as specified on drawings or in specifications.

B. Product Submittals: Submit to Engineer for approval, before commencing work, manufacturers data for all plumbing materials and equipment to be provided under this contract. Data shall clearly show compliance with specifications and scheduled data on drawings. In addition, submit drawings or diagrams, dimensioned and in correct scale, requested by Engineer or specified in individual sections, to clarify the work intended or to show its relationship to adjacent work or work of other trades. Contractor is responsible for any delays in job progress occurring directly or indirectly from late submissions. Submittals shall clearly show the following:

1. Technical and descriptive data in detail equal to or greater than the data given in the item specification. Indicate all characteristics, special modifications and features. Where performance and characteristic data is shown on the drawings or specified, submitted data shall be provided in sufficient detail that shows that the item is equal to that specified and shown.

2. All exceptions to, or deviations from, the Contract Documents.

3. Stamp: Indicate on each submittal that Contractor has checked that it complies with the drawings and specifications by affixing a stamp indicating the following: Date, specification page and section, drawing note indicating that manufacturer is as specified or that manufacturer is submitted to be approved as "or equal" by the Engineer, and signature of person reviewing the submittal.

C. Samples: Submit to Engineer for approval samples of materials as indicated elsewhere in these specifications. Samples shall duplicate materials, workmanship, and finish of products intended for installation.

1.6 RECORD DRAWINGS

A. Refer to DIVISION 01 - GENERAL REQUIREMENTS.

B. Contractor shall provide neatly annotated drawing prints showing all changes and deviations made in the installation of the work to the Engineer.

C. The Engineer will make the indicated changes to the original CAD Plumbing drawings, will label and date them as “RECORD DRAWINGS”, and provide them in CAD form to the Architect or Owner upon completion.

1.7 GUARANTY (WARRANTY)

A. Contractor shall warranty all mechanical work under this Division for a period of one year from the date of beneficial occupancy by the Owner.

B. This warranty shall include both materials and labor required to repair or replace any defective material or equipment.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. All materials and equipment shall be new and without blemish or defect. Equipment and materials shall be products which meet the requirements of these drawings and specifications. Where acceptance is contingent upon having the product examined, tested and certified by a recognized testing laboratory, the product shall be so examined, tested and certified, with documentation included in the product submittal. Where no special indication as to the type or quality of material or equipment is indicated, a first class standard article shall be furnished.

B. All equipment of one type specified in one section of these specifications, shall be the products of one manufacturer, unless specifically indicated otherwise. Substituted equipment or optional equipment where permitted and approved, must conform to space requirements. Substitutions of plumbing equipment for that shown on the schedules or designated by model number in the specifications will not be considered if the item is not a regular cataloged item shown in the current catalog of the manufacturer. Any substituted equipment that cannot meet space requirements, whether approved or not, shall be replaced at the Contractor's expense. Any modifications of related systems as a result of substitutions shall be made at the Contractor's expense.

C. The approval of submittals does not assure that the Engineer, or any Owner’s Representative, attests to the dimensional accuracy or dimensional suitability of the material or equipment involved, the sufficiency of the quantity of the material or items of equipment involved, or the mechanical performance of equipment. Approval of submittals does not invalidate the plans and specifications if in conflict, unless a letter requesting such change is submitted and specific approval is provided on the Engineer's letterhead.

D. Operating conditions and capacities must be as follows:

1. No overloading

2. No operation at conditions outside of maximum and minimum limits recommended by the manufacturer and approved by the Engineer.

3. Compatible with all systems.

4. Performance as delineated in schedules and in the specifications shall be interpreted as minimum performance.

E. Unless otherwise specified, all equipment and materials furnished must be as follows:

1. Recommended by the manufacturer for the application.

2. Installed in accord with the manufacturer's recommendations for the application.

F. It is the intent of these specifications that wherever a manufacturer of a product is specified as the “Basis of Design”, and the terms "other approved" or "or approved equal" or "equal" are used, a substituted item must conform in all respects to the specified item. The above terms are implied wherever practical and the quality of performance and equipment is not jeopardized. These terms are not restricted to the names in the specifications since the intent is to achieve a broad spectrum of interested bidders and vendors. Where the term “Acceptable” is used, only those manufacturers and/or products listed as “acceptable” may be submitted.

2.2 REJECTED WORK

A. Any work rejected by Engineer because it does not conform to specifications shall be removed immediately and replaced properly.

2.3 SLEEVES

A. General: Lay out work and set sleeves in new or existing construction so there shall be a minimum of cutting, drilling and patching. All sleeves not used during construction period shall be sealed. Unused penetrations or sleeves through fire rated barriers shall be sealed to prevent a passage of smoke or heat using an underwriters Laboratories approved method rated at least equal to the barrier penetrated. Submit proposed method with proof of UL approval with other submittals.

B. Pipe Sleeves:

1. Walls and Partitions:

a. Exterior Walls (Above Grade): Sleeves shall be mild steel pipe or plastic sleeves built into wall, partition or beam, sized to pass pipe and covering, leaving a clear space of 1/4-inch minimum between covering and sleeve. Penetrations of fire rated barriers shall have mild steel sleeves.

b. Exterior Walls (Below Grade): Sleeves with nominal 1/4-inch x 3-inch center flange (water stop) around the outside to be imbedded in the wall, constructed of cast iron, schedule 40 steel hot dipped galvanized after fabrication, or thermo-plastic designed for this application.

c. Interior Walls: Sleeves shall be mild steel pipe or plastic sleeves built into wall, partition or beam, sized to pass pipe and covering, leaving a clear space of 1/4-inch minimum between covering and sleeve. Penetrations of fire rated barriers shall have mild steel pipe sleeves.

d. Floors (Above Grade): Sleeves shall be 14 gauge galvanized sheet steel or plastic, set before floor is poured, sized to pass pipe and covering, leaving a clear space of 1/4-inch between covering and sleeve, and shall extend 1/2-inch above finished floor. Penetrations of fire rated barriers shall have mild steel pipe sleeves.

C. Sealing of Sleeves:

1. Sleeves Below Grade: Caulk annular space between pipe and sleeve using oakum and poured lead both sides minimum one inch to make wall penetration water tight. Specialty products, such as Thunderline's "Link-Seal", may be used.

2. Sleeves Above grade: Openings around pipes, duct, etc., passing through sleeves shall be made draft free and vermin-proof by packing solidly with mineral wool or fiberglass. Sleeves in exterior walls shall have outside surface of packing sealed with a weatherproof non-hardening sealant.

3. Sleeves through Fire Rated Barriers: Openings around pipes, etc., through fire rated barriers shall be sealed using a UL approved method rated at least equal to the wall or floor being penetrated.

2.4 FLOOR, WALL AND CEILING PLATES OR ESCUTCHEONS, IN EXPOSED AREAS

A. Provide escutcheons or fabricated plates or collars at each location where pipe or duct passes through a finished surface. Escutcheons for flush sleeves shall be equal to Benton & Caldwell No. 3A chromium plated brass; for sleeves extending above floor shall be equal to Benton Caldwell No. 36 chrome plated brass.

B. Collars or plates for larger diameter insulated pipe shall be fabricated of 18 gauge galvanized copper hearing sheet steel, secured to structure and neatly fitted around pipe.

2.5 ACCESS DOORS

A. Provide as necessary for access to concealed valves, cleanouts, unions, expansion joints, dampers, coils, junction boxes, etc., where no other means of access is shown or specified.

B. Door shall be manufactured by the Milcor division of Inland-Ryerson, or acceptable equal, type as follows:

Door Location	Door type
Drywall	Style "DW"

Masonry or tile	Style "M-Stainless"
Acoustical tile	Style "AT"
Plaster	Style "K"
Fire-rated walls	Style "Fire Rated"

C. Each door shall be equipped with two flush, screwdriver operated, cam latches as a minimum. Hinged doors shall be provided unless location limits operation. Doors, other than Style "M", shall be finished to match adjacent surface. Door sizes shall be applicable to the access required for normal service.

2.6 ELECTRICAL

A. General: Unless specifically specified otherwise, motors, starters, and control devices shall be furnished under the Section of specifications that covers the driven equipment.

B. All electrical power wiring, conduits, and connections shall be provided under the Electrical Division.

C. All control and interlock wiring, and conduit, shall be provided by Mechanical Division in accordance with the Electrical Division of the specifications.

D. Contractor furnishing driven equipment shall coordinate wiring diagrams with contract requirements and shall furnish coordinated wiring diagrams for installation.

E. Motors: Unless specifically noted otherwise in the Section covering the driven equipment (or the equipment drives), motors shall comply with the following:

1. Three Phase: NEMA design B, three-phase, squirrel cage induction type designed for 1800 rpm synchronous speed for operation in 40 degrees C ambient at 1.15 service factor at constant speed on the scheduled voltage. Motors shall be insulated with Class B insulation material and shall be cast iron, drip proof, horizontal foot mounted type with ball bearings. Two speed motors shall be provided as scheduled and shall be two winding type. Motors shall be high-efficiency type.

2. Single Phase: Squirrel cage induction type designed for 1800 rpm synchronous speed for operation in 40 degree C ambient at 1.15 service factor at constant speed on the scheduled voltage. Motors shall be insulated with Class B insulation materials and shall be two winding capacitor start type with steel enclosure, drip proof, horizontal foot mount and ball bearings.

3. Scheduled Horsepowers: The horsepowers scheduled or specified are those nominal sized estimated to be required by the equipment when operation at specified duties and efficiencies. In the case of pumps, these horsepowers are non-overloading and may also include provisions for future planned impeller changes. If the actual horsepower for the equipment furnished differs from that specified or shown on the drawings, it shall be the Contractor's responsibility to insure that proper size

feeders, breakers, starters, etc. are provided at no change in contract price.

4. Outdoor Ambient Conditions: Motors located in outside ambient conditions shall be Totally Enclosed Fan Cooled (TEFC) designed for 50 C ambient conditions.

5. Motor Efficiency Requirements:

Motor HP	Standard Eff	Hi Eff ODP
0.5	71.0	-
0.75	76.8	-
1.0	79.0	82.5
1.5	79.0	84.0
2.0	80.7	84.0
3.0	81.5	86.5
5.0	84.0	87.5
7.5	82.9	88.5
10.0	85.6	89.5
15.0	89.5	91.0
20.0	87.5	91.0
25.0	87.1	91.7
30.0	88.3	92.4
40.0	90.2	93.0

6. Starters: Shall be provided as work of the Plumbing Division and shall meet the requirements of the Electrical section entitled "Starters" if provided. Refer to the Section entitled "Variable Frequency Drives", if provided, for additional information on electric motors for that service.

2.7 BELT DRIVES

A. Equip each motor driven machine (not direct connected) with V-belt drive. Belts shall be of correct cross section to fit properly in sheave grooves and shall be carefully matched for each drive. Sheaves shall be cast iron or steel, bored to fit properly on shafts and secured with keys of proper size. The rating of each drive shall be as recommended by manufacturer for service but shall be at least 1.5 times nameplate rating of motor.

B. Fan Belt Drives: Variable and adjustable pitch sheaves shall be selected so that required fan RPM will be obtained with sheave set approximately in mid-position. Fans shall have drives in accord with the following table:

Output (Horsepower)	Fan Speed Motor (RPM)	Sheave Type
0 to 10	Up to 1800	Variable Pitch
15 and up	Up to 1800	Fixed Pitch
0 to 3	1801 and up	Variable Pitch
15 and up	1801 and up	Fixed Pitch

C. Speed adjustment: Adjust fan speed as necessary to obtain proper design air flow with fan in its installed location. Fans which are to have fixed pitch drives

may be first fitted with variable pitch drives until proper speed adjustment is made and then may be fitted with proper fixed pitch drive size, or alternate sizes of fixed pitch drives may be used until proper fan speed is obtained. Provide all drives necessary to obtain proper fan speed needed to deliver necessary air quantity.

D. Vibration: Field vibration levels will not be acceptable if the maximum vibration velocity or displacement measurement exceeds the following values (when measurements are taken at the bearing supports of the driven equipment using a vibration analyzer with the filter set at the operating fan speed):

Fan Speed (RPM)	Maximum Vibration Level
800 or Less displacement	5 Mills (0.127 mm) max.
801 and Greater velocity	0.20 in/sec. (5mm/s) max.

2.8 BELT AND COUPLING GUARDS

A. Each belt drive shall be equipped with a guard. Guards shall be constructed of substantial sheet metal #18 U.S. standard gauge or heavier. Braces or supports must not "bridge" sound and vibration isolators. Guards shall be designed with adequate provision for movement of motor required to adjust belt tension. Means shall also be provided to permit oiling, use of speed counters, and other maintenance and testing operations with guard in place.

B. All direct drive equipment shall have coupling guards in compliance with OSHA requirements.

2.9 DIAGRAMS, NAMEPLATES AND LABELS

A. Each major component of equipment shall have the manufacture's name, address and catalog number on a plate securely affixed in a conspicuous place. The nameplate of a distributing agent will not be accepted.

B. In areas having equipment, valves and control devices, provide single line diagrams in Operation and Maintenance manuals. The diagrams shall give name, number designation, and location of each piece of equipment, valve, and control device.

C. All pieces of equipment, valves, starters, disconnects, and all control instruments and apparatus shall be identified with 1/16 inch thick black laminated plastic nameplate with 3/16 inch high white laminated letters. Similar and like equipment shall be designated with numerical suffix (example: VALVE, V-1). The nameplate identification shall coincide with items appearing on diagrams. Colors and sizes may be changed to conform to an existing Owner’s Identification System.

D. All labels shall be securely affixed to equipment, or to supporting surfaces adjacent to small equipment.

2.10 PAINTING AND MARKING

A. Painting: Painting of equipment and pipe (insulated or uninsulated) is specified under the "PAINTING" Division of these specifications.

B. Touch-up of shop coat shall be performed under section furnishing equipment.

C. Refer to the requirements of the Section IDENTIFICATION OF PIPING in the Mechanical Division if included.

2.11 HOUSEKEEPING PADS

A. Provide six inch (6") high reinforced concrete (#10 mesh with 1-1/2" top cover) housekeeping pad for each piece of floor or grade-mounted equipment, unless shown otherwise on the drawings.

B. The housekeeping pad shall extend six inches (6") beyond the equipment in all directions and shall be continuous beneath the base, unless shown otherwise on the drawings.

C. Pads shall have chamfered edges and shall be poured and finished smooth and level to insure proper and continuous support for the equipment base bearing surfaces.

D. Provide embedded anchor bolts to suit equipment base and grout all bearing surfaces true prior to securing base to housekeeping pad. Isolate equipment base from pad with 1/8” thick neoprene material.

PART 3 - INSTALLATION

3.1 INSTALLATION AND WORKMANSHIP

A. The work shall be performed by qualified mechanics and all materials, apparatus and equipment shall be installed in neat, workmanlike manner. Any material, apparatus or equipment which, in the opinion of the Engineer, is improperly installed shall be removed and reinstalled in an approved manner at no additional cost to the Owner.

B. The work shall be coordinated with the work of other trades. Where the work is dependent upon work of other trades or work already in place, such other work and work in place shall be examined and shall be in proper condition and state of completion before continuing the installation.

3.2 STORAGE OF MATERIALS

A. Use of site for storage of materials shall be in accordance with the DIVISION 01 – GENERAL REQUIREMENTS, and such other provisions of these Contract Documents that may limit or restrict use of the project site.

B. The Contractor shall protect all materials and equipment from the time of receipt until the time of building acceptance by the Owner. Material and equipment shall be protected at all times from physical damage and from the effects of weather and humidity. Materials and equipment that are to be installed indoors should be

stored indoors if possible. Coordinate the installation of the material and equipment with related work and finishing of adjacent surfaces to prevent damage to the equipment or adjacent finishes. Replace or repair to the Engineer's satisfaction any damaged equipment

3.3 EXCAVATION AND BACKFILL

A. Refer to DIVISION 02 – EXISTING CONDITIONS, and DIVISION 23 – MECHANICAL SITEWORK if provided.

B. Provide as necessary to accomplish work specified. Perform in accordance with applicable State and Local codes and accepted good practice.

3.4 PROTECTION OF WORK UNTIL FINAL ACCEPTANCE

A. Contractor shall protect all materials and equipment from physical damage, the entrance of dirt and construction debris, and the effects of weather, from the time of installation until final acceptance.

B. Any materials and equipment that has been damaged shall be repaired to "as new" condition, or replaced at the direction of the Engineer. Where minor damage occurs to factory, damaged finishes may be touched up with factory-provided finishing materials. If, in the opinion of the Engineer the damage is excessive, factory finish shall be replaced to "new" condition.

3.5 TEST

A. General: All systems shall be inspected, tested, given a trial run, and demonstrated to Engineer's and Owners satisfaction that they are complete, operational, and ready for use.

B. Plumbing Waste and Soil Lines: Shall be inspected and tested in accordance with local codes.

C. Piping; unless required otherwise by code or other divisions of specifications, pressure piping shall be tested at pressure of one hundred fifty percent (150%) of normal working pressure. Contractor shall valve off or otherwise isolate all equipment from piping pressure test so as to prevent damage to the equipment.

D. Specialty systems shall be tested as described in their individual Sections of the specifications.

3.6 INSTRUCTION AND MAINTENANCE MANUALS

A. Refer to the Section entitled OPERATION AND MAINTENANCE MANUALS.

B. Refer to individual specifications Sections for specific instruction requirements.

3.7 ACCEPTANCE

A. Prior to requesting final inspection:

1. Complete all work required by drawings and specifications.

2. Provide test and balance report to Engineer at least two (2) days prior to time of final inspection.

3. Contractor shall furnish necessary mechanics, furnish test instruments and equipment as required to make necessary adjustments, and to assist with the final inspection.

B. Acceptance will be made by Engineer on the basis of tests and inspection of project.

End of Section

SECTION 22 00 02 PLUMBING DEMOLITION

PART 1 - GENERAL

1.1 SCOPE

A. Section includes requirements for mechanical demolition/removal work in this project. Work includes, but is not limited to, the following:

B. Mechanical demolition work does not include:

1. Demolition/asbestos removal.

2. Site preparation/clearing.

3. Structure modifications.

1.2 RELATED DOCUMENTS

A. Work specified herein is included in the base contract work.

B. Work specified herein may depend or be affected by other provisions of the Contract Documents. Review to ascertain thorough understanding and coordinate as required. Specific reference is made to the following:

1.3 DEFINITIONS

A. Demolition/removal shall include demolition indicated or required to make way for new work, possibly to include but not limited to, the following:

B. It may include salvage, storage, disposal, securing, protecting, re-routing, temporary work, and coordination of maintaining operative portions of the facilities during the work.

1.4 SUBMITTALS

A. General:

1. Submittals required by this Section are listed hereinafter.

2. All qualifications and product sources shall be submitted concurrently unless review sequencing dictates otherwise.

3. For additional data on submittals and method refer to Division 1.

B. Demolition Plan and Schedule of Work: Submit not less than 5 days prior to pre-demolition meeting.

PART 2 - PROVISIONS

2.1 QUALITY ASSURANCE PROVISIONS

A. Ascertain that those involved in the work are knowledgeable of scope, expected results and experienced or trained in all aspects of the demolition to which assigned.

B. Regulatory Requirements: Refer to Division 1.

C. Contractor shall prepare graphically and/or in writing a demolition plan and schedule responding to at least the following:

1. Construction schedule and demolition plans and schedules related thereto.

2. Demolition Procedures: Dirt, dust, debris and noise to be expected and plans for control and removal.

3. Proposed on-site haul route(s) and means to control and keep clean.

4. On-site haul route(s) and means to control and keep clean.

5. Coordination plans with governmental agencies relative to haul routes off-site, and the hauling and disposal of debris.

6. Coordination plans with separate sub-contractors.

7. Coordination plans with Owner where continued occupancy is required.

8. Barrier, protection and security plans.

9. Removal, protection and delivery procedures for items to be Contractor-removed (salvaged) and stored for subsequent Contractor re-installation.

10. Removal, protection and delivery procedures for items to be Contractor-removed (salvaged) and delivered to Owner.

11. Method and means to leave required utilities, other systems, etc., operative until "Permanently" activated or de-activated.

12. Contractor shall substantiate that all portions of plan are workable and that concurrence of governing authorities has been obtained.

D. Pre-demolition Meeting: A meeting to coordinate demolition, discuss demolition plan, and schedule of work shall be held. It may be held concurrently with Pre-Construction Meeting. Meeting shall be held prior to beginning of any demolition work. Attendance shall include:

1. Architect/Engineer

2. Owner

3. Contractor's Superintendent

4. Superintendent of Subcontractors or others that will be involved in demolition

5. Others as may be requested or desire to attend

E. A/E and Owner will:

1. Review plan and schedule advising Contractor accordingly.

2. Advise of location(s) for contractor delivery of salvaged items to be Owner stored.

F. Demolition work shall not start until plan and schedule are acceptable to Owner and A/E.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Refer to Division 1 for additional requirements applicable to execution of the work.

B. Work forms a substrate for subsequent work of other trades. Determine quality control requirements of subsequent trades and work thereto.

C. Public and site utilities, and other systems or services known to exist are indicated. Others may exist. Exact locations are unknown and conditions other than indicated or implied may exist. Contractor is warned to proceed with caution at all times. Owner(s) of known or discovered utility(s) shall be notified prior to beginning or continuing work (upon discovery) to gain further information as to location, extent, installation conditions and to coordinate work involving such. Should emergencies involving existing utilities or services occur, Contractor shall immediately notify utility Owner(s) and proper authority and shall implement corrective action to limit of his capability.

D. Ascertain items to be protected are identified.

E. Ascertain that demolition does not result in damage to structural members.

3.2 PREPARATION

A. Provide barriers, protection and security from demolition work for property and person. [Barbed wire, razor wire, or similar types of materials will not be used.]

B. Ascertain items to be removed, stored or salvaged are properly removed, protected and delivered. Items to be Contractor stored shall remain Contractor's responsibility to protect until re-installation. Items to be removed from the site become the property of the contractor.

C. Control dirt, dust, debris and waste accumulation.

3.3 ERECTION/INSTALLATION/APPLICATION

A. Perform demolition required. Remove debris, waste, etc. from site as accumulated.

1. Use of explosives or burning is prohibited.

2. Maintain continuity of required utilities, other systems, etc., while work is being performed through use of approved temporary means.

3.4 ADJUSTING/CLEANING/PROTECTION

A. Items/surfaces not intended to be removed or which become damaged by demolition shall be repaired/replaced by Contractor.

B. All debris and waste shall be removed from site.

End of Section

SECTION 22 01 00 OPERATION AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide complete operation and maintenance manuals to the Owner on all equipment and systems.

B. The manuals shall be bound in hard-back, three ring loose-leaf binders.

C. Provide separate individual binders for Fire Protection, HVAC, HVAC Controls, and Plumbing O&M materials.

PART 2 - PRODUCTS

2.1 MANUAL ORGANIZATION

A. Contents:

1. Provide index page(s) of contents.

2. Tab manual with labels for the following:

a. Contents

b. Contractor Data

c. Operating Instructions

d. Submittal Data

e. Control Diagrams

f. TAB Report

g. Warranties

h. Acknowledgments

B. Contractor Data:

1. Provide Project name, address, and date of substantial completion.

2. Provide names and addresses of:

a. General Contractor

b. Mechanical Contractors

c. Mechanical Subcontractors

d. Controls Subcontractor

e. TAB Contractor

f. Equipment Suppliers

3. Operating Instructions:

4. Provide typewritten operating instructions for the Owner.

5. Describe how to start or stop each mechanical system or individually controlled piece of equipment.

6. Describe how to set the temperature control system for normal operation, emergency shutdown, and normal restart procedures after power failure.

7. Describe all caution or warning notices posted on or with the equipment or systems.

C. Submittal Data:

1. Provide copy of all approved submittal data, shop drawings, etc., as finally provided on this project.

2. Each piece of submittal data should describe material or equipment actually installed on this project.

D. Control Diagrams:

1. Provide corrected control diagrams to reflect "As-Built" conditions.

E. TAB Report:

1. Provide copy of the final Test and Balance report in the HVAC binder.

2. Annotate final report with any changes which occurred since publication of final TAB report.

F. Warranties:

1. Provide copy or statement of the general warranty of the Contractor (or Mechanical Subcontractor), including the dates of the warranty period.

2. Provide copies of vendor (equipment manufacturer) warranties, specifically including those manufacturers who warranty their product for more than one year.

G. Acknowledgments:

1. Copies of Owner's written acknowledgments of receipt of instructions for operation of equipment or systems.

2. Copies of certificates of inspection by local authorities having jurisdiction.

3. Copies of all permits obtained by Contractor for this project. Permit copies shall clearly show the applicable dates and issuing authority. Include instructions for Owner's requirements to maintain permits in force, or other action that may be required of the Owner to renew, or modify, a permit.

2.2 QUANTITY

A. Provide Operation and Maintenance Manuals as follows:

1. Provide three (3) complete manuals for each discipline with information on all equipment of that discipline in the project. One copy of each discipline will be retained by the Mechanical Engineer and the other two are for the Owner's use.

PART 3 - EXECUTION

3.1 DELIVERY

A. Submit draft manual to Engineer for approval 30 days prior to beginning of test and balance work.

B. Provide a HVAC manual and a HVAC Controls manual for use by the Test and Balance Contractor during test and balance work.

C. Deliver the final manuals to the Engineer prior to submitting application for final payment.

End of Section

SECTION 22 07 00 THERMAL INSULATION

PART 1 - GENERAL

1.1 SCOPE

A. Provide labor and materials to insulate equipment, piping, and miscellaneous items in the piping systems as indicated on the drawings and specified herein.

1.2 RELATION TO OTHER WORK

A. Refer to the Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. No insulation adhesives, materials or finishes shall be applied until the item to be insulated has been completely installed, tested and proved tight.

1.3 SUBMITTALS

A. Submittals shall contain complete descriptive and engineering data, including flame spread and smoke developed ratings (ASTM E84 test method), on all materials and adhesives.

B. Where finishes, covers, or jackets are specified, provide complete data on same.

C. Submittals shall contain specified information on: densities, conductivities, conductances, or resistances as required to establish conformance with the specified values or materials.

D. Where compliance with an industry, society, or association standard is specified or indicated, certification of such compliance shall be included in the submittal.

1.4 STORAGE OF MATERIALS

A. Insulation, adhesives, and finishes may be stored at the site provided that they are stored in such a manner as to protect them from damage. Use of the site shall comply with the General Conditions and such other provisions of the Contract Documents as may limit or restrict said use.

B. Do not store flammable materials within the building.

C. Do not store fiberglass insulation within the building until it has been "dried in". If no other dry space is available and this insulation must be installed or stored before the building is "dried in" and completely enclosed, provide polyethylene film cover for protection.

1.5 INDUSTRY STANDARDS

A. All materials and adhesives used on piping systems, and in or on ductwork, shall conform to the requirements of NFPA 90A as to flame spread and smoke developed ratings.

B. All products shall bear labels indicating their compliance with the requirements of NFPA 90A as to the flame spread and smoke developed ratings.

1.6 MANUFACTURER

A. Manufacturers are indicated in "Basis of Design" to establish the quality and performance standards of the desired material.

B. Other manufacturers whose products are equal in all respects to those specified may be submitted for approval.

PART 2 - MATERIALS

2.1 INSULATING MATERIALS

A. Preformed Glass Fiber Pipe Insulation with All Purpose Self-Sealing Jacket:

1. Uniform construction of long glass fibers bonded in resin, with factory applied jacket.

2. Thermal conductivity "k" factor at 75oF of 0.25 or less.

3. Water vapor permeability of 0.02 perm/inch or less.

4. Fire/smoke rating of 25/50 or less.

5. Suitable for piping temperatures up to 500oF.

6. Basis of Design: John Manville "Micro-Lok" with AP-T Plus jacket.

B. Removable Insulation Blankets:

1. Provide removable insulation blankets fabricated to fit the configuration of the item being insulated, i.e., pump, valve, etc. The blankets must fit with no resulting gaps or compression of the insulation in order to maintain their insulating effectiveness. All materials shall be temperature resistant to 500oF minimum.

2. Insulating filler: Glass fiber, matted, 10 lbs/cu.ft. density, conforming to MIL-1-16411 Type 11, or Alumina Silica Refractory fiber matting.

3. Hot/Cold Face Enclosure Material: Alpha Style C911-3259 silicone impregnated glass fiber fabric, 17.5 oz./sq.yd. total weight, 24% of which is silicone.

4. Fasteners: Velcro one inch (1") wide straps permanently sewn to blanket with opposing securement flap sewn in the appropriate location.

5. Basis of Design: "The M.A.C. Group"

2.2 SEALANTS AND COATINGS

A. Sealants

1. Vapor Barrier Sealant: Fast setting, water resistant adhesive-sealant designed for bonding two impermeable surfaces. Non-flammable in wet state. Serviceable from -20oF to 200oF. Fire/smoke rating of 25/50 or less.

   a. Basis of Design: Foster's 85-75 Contact Bond Cement.

B. Coatings and Fabrics:

1. Cellular Glass Coating and Joint Sealant: Acrylic latex water base, highly flexible, fire resistive coating, serviceable from -30oF to 180oF., permeability of 0.4 perm inch, Fire/Smoke rating of 25/50 or less.

   a. Basis of Design: Pittcote 404.

2. Cellular Glass Coating: Asphalt based coating, serviceable from -40oF to 200oF. with permeability of 0.4 perm inch.

   a. Basis of Design: Pittsburgh Corning "Pittcote 300" (for outdoor use only).

3. Fabric: Polyester mesh fabric. 0.125 inch mesh opening, high tensile strength.

   a. Basis of Design: Pittsburgh Corning Fabric 79.

2.3 FINISHES

A. Thermal Insulation Coating: Tough, washable, abrasive resistant, non-flammable coating for thermal insulation not requiring an external vapor barrier. Serviceability from 0oF to 180oF. Fire-smoke rating of 25/50 or less.

   1. Basis of Design: Foster's 30-36 Coating.

B. Pipe Jacketing: Aluminum jacketing, 0.016 inches thick, type 3003 alloy, H-14 temper, circumferentially corrugated, with a continuously laminated moisture barrier of one mil polyethylene film and a protective layer of 40 lb. virgin paper.

   1. Basis of Design: Childers Products Co. "Corrolon".

C. Pipe Fitting Covers: Aluminum fitting covers, 0.20 inches minimum thickness, type 3003 alloy, H-14 temper prefabricated fitting covers with baked epoxy moisture barrier for pipe sizes through 24". Field fabricate fitting covers for pipe sizes larger than 24" using 0.020 inches thick aluminum roll jacketing with laminated polyethylene/kraft moisture barrier.

1. Basis of Design: Childers Products "Ell-Jacs", "Gore Ell-Jacs", "Tee-Jacks", "End-Caps", "Beveled Collars", "Valve Fitting Covers", and "Flange Jacs".

PART 3 - MATERIALS

3.1 GENERAL

A. The insulation of a particular item shall be considered as an insulation system. All components of this system, including adhesives mastics, sealants, coatings, and finishes, shall be as recommended by the insulation manufacturer as compatible for use with his insulation. The installation of the insulation system shall be in accordance with the insulation manufacturer's recommendations.

3.2 DOMESTINC HOT WATER AND HOT WATER RECIRCULATING PIPING

A. Insulate all hot water and hot water recirculating pipe, valves, and fittings with 1" thick, three and one-half (3-1/2) pound density fiberglass insulation with longitudinal seams lapped and butt joints covered with three inch-wide strip. All joints to be stapled with outward cinch staples and set with vapor barrier adhesive. All fittings, etc., to be mitered and covered with glass fab and mastic. Leave pipe bare one foot each side of aquastats.

B. Insulate all cold water pipe, valves, and fittings located outside of the building thermal envelope with 1" thick, three and one-half (3-1/2) pound density fiberglass insulation with longitudinal seams lapped and butt joints covered with three inch-wide strip. All joints to be stapled with outward cinch staples and set with vapor barrier adhesive. All fittings, etc., to be mitered and covered with glass fab and mastic.

3.3 ROOF DRAINS AND LEADERS, INSIDE OF BUILDING

A. Insulate back of roof drains with flexible blanket insulation 1-1/2" thick with vapor barrier facing. Adhere insulation to roof drain with fiberglass insulation to metal adhesive. Insulate piping from roof drain through vertical drop and first elbow, and all horizontal drain piping concealed inside the building. Provide a vapor barrier using vapor barrier sealant for all joints and laps.

3.4 INSULATION FIT

A. Where insulation is applied to pipe or equipment, it shall be installed with all joints fitted to eliminate voids. Voids shall not be filled with joint sealant, but shall be eliminated by refitting or replacing insulation.

3.5 PROTECTION OF WORK

A. Protect all finishes and vapor barrier seals from damage prior to final acceptance and make repairs to damaged finishes or vapor barriers immediately.

B. Protect adjacent surfaces from damage or spillage during installation and cleanup any spillage or spatters of adhesives or finishes immediately.

End of Section

SECTION 22 11 00 POTABLE WATER PIPE VALVES AND FITTINGS

PART 1 - GENERAL

1.1 SCOPE

A. Provide potable water piping systems complete as indicated on the drawings.

B. Drawing scales prohibit the indication of all offsets, fittings, sleeves, and similar items; however, these items shall be provided to form a complete and properly installed system at no additional cost to the Owner.

C. Contractor may use either the copper or the plastic piping systems specified, provided it is in compliance with all codes and ordinances. Plastic piping in return air plenums must be insulated.

1.2 RELATION TO OTHER WORK

A. Refer to Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Refer to the Section entitled HANGERS AND SUPPORTS. Piping systems requiring fixed locations and slopes shall have priority over those which do not have these requirements.

C. Refer to the Section entitled THERMAL INSULATION.

D. Refer to the Section entitled BACKFLOW PREVENTERS.

1.3 SUBMITTALS

A. Refer to Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

1.4 MANUFACTURER

A. Items used as a basis of design to set standards of quality and design are indicated where used. Unless otherwise stated, products of other manufacturers which equal or exceed the quality and design of the indicated item(s) may be submitted for approval.

B. Manufacturers listed as "Acceptable" in addition to the basis of design shall limit the acceptable manufacturers to those listed.

PART 2 - MATERIAL AND EQUIPMENT

2.1 PIPE - BELOW GRADE

A. Hard drawn copper, Type K, ASTM B 88.

B. Chlorinated Polyvinyl Chloride (CPVC) plastic pipe, ASTM D 2846, ASTM F 441, NSF Std. 14.

C. Polyvinyl Chloride (PVC) plastic pipe, Schedule 40, ASTM D 2466, NSF Std.14.

D. Outside coated AWWA C-151 Ductile iron pipe with AWWA C-104 cement mortar lining and AWWA C-111 rubber gasket joints.

2.2 PIPE-ABOVE GRADE

A. Hard drawn copper, Type L, ASTM B 88.

B. Chlorinated Polyvinyl Chloride (CPVC) plastic pipe, ASTM D 2846, ASTM F 441, NSF Std 14.

C. Polyvinyl Chloride (PVC) plastic pipe, Schedule 40, ASTM D 2466, NSF Std.14.

2.3 FITTINGS

A. Copper: Wrought copper, solder joint, pressure type, ANSI B16.22.

B. CPVC: CPVC Socket Type, ASTM D 2846, ASTM F 439, NSF Std.14.

C. PVC: PVC Socket Type, ASTM D 2466, NSF Std. 14.

D. Ductile Iron: Ductile Iron Fittings, AWWA C 110.

2.4 SOLDER

A. Lead Free Composition 95.5% tin, 4% copper, 0.5% silver, Engelhard "Silvabrite 100".

B. Lead Free Composition Sb5 (95% tin, 5% antimony).

C. Sil Fos.

2.5 WALL, FLOOR, AND CEILING ESCUTCHEON PLATES

A. Chromium plated brass, split, spring lock type. and or chromium plated brass, one piece, non-adjustable.

2.6 DIELECTRIC ISOLATORS

A. EPCO insulated unions or companion flanges or F.H. Mahoney Type E, Series 15, flange insulation sets with appropriate flanges. Coupling type isolators are not acceptable.

2.7 SHOCK ARRESTERS

A. Shall be manufactured, tested and certified in accordance with PDI-WH201. Provide ball valve between system and shock arrester. Acceptable Josam; Wade; Zurn; or Smith.

2.8 RELIEF VALVES

A. ASME rated, size and setting as indicated on drawings.

2.9 VALVES

A. General: Valve numbers indicated are to set standard of quality and design.

B. Ball Valves (2" and Smaller): Bronze body, stainless steel ball and stem, teflon seats and rings, and threaded ends. Where valve is located in an insulated line, provide extended tee handle with memory stop. Acceptable: Watts No. B-6800-SS-VT, Apollo #82-100.

C. Ball valves (2-1/2" to 4"): Bronze body, stainless steel ball and stem Teflon seats and rings, and flanged ends. Where valve is located in an insulated line, provide extended tee handle with memory stop. Acceptable: Watts No. B-6000-SS-04.

D. Globe Valves: Solder joint, bronze body, union bonnet, composition disc, 300 lb. WOG. Acceptable: Crane No. 1707-AS, NIBCO S-413-B or Hammond IB 912.

E. Check Valves: Solder joint, swing check, screwed cap, bronze disc, Y pattern, 125 lb. SWP, 200 lb.WOG. Acceptable: Crane No. 1707S, NIBCO S-413-B or Hammond IB 912.

F. Hose Bibb: Acorn Series 8121 with 3/4" hose threads, integral vacuum breaker, and vandal-proof lock-shield with key handle, polished chrome plated finish. Acceptable: Woodford, NIBCO.

G. Butterfly Valves:

1. Pattern: Valves for dead end service shall be of the threaded lug body type (at connections to equipment and system expansion points where portions of piping must be removed for service or access). Valves for in line service may be wafer or threaded lug body type. All valves shall have extended necks for insulation clearance.

2. Body: Cast iron.

3. Disc: Bronze or semi-steel with welded nickel edge, 416 stainless steel shaft, bronze bearings and Hycar seals.

4. Seat: Hycar bonded to a backup ring which, on lug body valves, shall have metal seat retaining ring for positive dead end shut-off under load. All valves shall be capable of bubble tight shut-off at pressure differentials of 175 psig.

5. Operators:

a. Valves 2" Through 6": Shall have infinite position lever with memory stop.

b. Valves 8" and Larger: Shall have gear type operators with: chain wheel, hand wheel, or crank type operating mechanisms as indicated on the drawings.

c. Provide stem extensions (in addition to insulation clearance extension specified hereinbefore) as required to place operators in an easily accessible location free of interference with adjacent piping, equipment, structure, and the like.

6. Acceptable: Dezurik Figure 632.

2.10 BACKFLOW PREVENTER

A. Shall be a reduced pressure type, consisting of two independently operated, spring loaded poppet type check valves arranged in tandem with a protective zone of reduced pressure between them. This zone is controlled by a mechanically independent diaphragm-actuated relief valve that depends solely on hydraulic line pressures for operation.

B. Drain Assembly: Provide vented elbow for small backflow prevention devices and air gap drain connectors for large backflow prevention devices.

C. Acceptable: Hersey Aergap Model FRP II sizes 3/4 inch to 2 inch and Model 6CM sizes 2-1/2 inch to 10 inch.

PART 3 - INSTALLATION

3.1 GENERAL

A. Piping shall be run parallel to the walls and ceilings in a neat and workmanlike manner and shall be offset as required to avoid interference with the structural or architectural features and the work of other trades.

B. Piping shall be installed with provisions for expansion both horizontally and vertically in all long runs including runouts from risers.

C. Completely encase buried copper tubing and cast ductile iron piping with polyethylene tube or sheet material in accordance with AWWA C-105.

D. Insulated Piping: Hangers shall be oversized to allow insulation to be run continuously through the hanger. Supports shall have insulation material sized to met insulation thickness and have adequate support strength.

3.2 JOINTS AND CONNECTIONS

A. General: Joints and connections shall be made permanently air, gas, and water tight.

B. Solder joints: Cut pipe square using pipe cutting tool which does not crimp the pipe. Remove all burrs using pipe reamer and taking care not to flare the pipe end. Thoroughly clean the outside of the pipe and the interior of the valves and

fittings using a fine sand cloth. Apply non-corrosive paste flux to the cleaned surfaces immediately and apply solder and heat in accordance with manufacturer's instructions to complete joint. Use care not to damage valves and follow the valve manufacturer's installation instructions explicitly.

1. Socket Joints: Cut piping square using pipe cutting tool. Remove all burrs using a pipe reamer or file. Thoroughly clean outside of pipe and inside of fittings with solvent. Apply cement in accordance with manufacturer's recommendations.

2. Equipment Connections:

   a. General: connections to equipment shall be made in accordance with details on the drawings and the equipment manufacturer's installation instructions.

   b. Where incompatible piping materials come in contact, except for use of valves, isolate the two materials using dielectric isolators.

   c. Provide roughing materials and connect equipment under other sections of the specifications or by the Owner as indicated on the drawings, in the schedules, and as specified.

   d. 2 Inches and Smaller: Shall be made with unions.

   e. 2-1/2 Inches and Larger: Shall be made with flanges.

3.3 VALVES

A. All valves, stops, pressure regulators and similar items shall be installed in an easily accessible location.

B. Provide access panels for all concealed valves.

3.4 SHOCK ARRESTERS

A. Provide as indicated on the drawings.

B. Provide ahead of all solenoid valves.

3.5 SERVICE CONNECTIONS

A. Make application to proper authority and obtain water connections.

B. The Contractor shall include the cost of all components as per the General Conditions including meter and tap fees.

3.6 TEST

A. Test piping systems prior to the application of any insulation and prior to their being rendered inaccessible by the progress of the work.

B. Pressure test the potable water piping at one hundred fifty percent (150%) of working pressure.

C. The system shall hold the pressure for such time as required to indicate its integrity to the satisfaction of the Engineer but in no case less than one hour.

3.7 CLEANING

A. The pipe, valves, and fittings shall be kept clean and protected from the entrance of dirt, non-potable water, and construction debris during the installation process.

B. The system shall be thoroughly flushed and then sterilized.

3.8 STERILIZATION

A. All potable water piping shall be disinfected with a mixture containing not less than 0.6 pound of high-test (70% available chlorine) calcium hypochlorite, or 2 pounds of chlorinated lime to each 1000 gallons of water to provide not less than 50 ppm of available chlorine.

B. The mixture shall be injected into the system and retained for not less than 12 hours.

C. The system shall then be drained, flushed with potable water and placed in service.

D. Upon completion of the sterilization process the contractor shall take samples for three consecutive days to the local health department for testing. The contractor shall pay for the testing and provide reports of the testing results to the Engineer.

End of Section

SECTION 22 13 00 SOIL, WASTE, VENT AND DRAIN PIPING SYSTEMS

PART 1 - GENERAL

1.1 SCOPE

A. Provide soil, waste, vent, and drain piping systems complete as indicated on drawings.

B. Drawing scales prohibit the indication of all offsets, fittings, sleeves, and similar items; however, these deviations shall be provided as work of this section at no additional cost to Owner.

1. Contractor may use either the copper or the plastic piping systems specified, provided it is in compliance with all codes and ordinances. Plastic piping in return air plenums must be insulated.

C. Kitchens: Provide only cast iron piping system upstream of grease separator.

D. Boiler Rooms: Provide only cast iron piping system downstream of all hot condensate discharge points, including those points with cool-down devices.

1.2 RELATION TO OTHER WORK

A. Refer to Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Refer to Section entitled HANGERS AND SUPPORTS.

C. Piping systems requiring fixed locations and slopes shall take priority over those which do not have both requirements.

1.3 SUBMITTALS

A. Refer to Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

1.4 MANUFACTURER

A. Where a specific manufacturer's product is listed as the basis of design, it is to set the level of design and quality of the item to be furnished. Equal products of other manufacturers may be submitted for approval.

B. Where specific manufacturers/or products are listed as "Acceptable", only selections from those listed products will be approved.

PART 2 - MATERIAL AND EQUIPMENT

2.1 PIPE - BELOW GRADE

A. Cast iron soil pipe, hub and spigot pattern, No-hub pattern, service weight, coated with coal-tar pitch varnish. Each piece of pipe shall be marked with weight and manufacturer's name and identification mark of Cast Iron Soil Pipe Institute, signifying compliance with ASTM A 74 or ASTM A 888, and CISPI 301. Coupling joints shall comply with ASTM C564 and CISPI 310.

B. Type DWV hard drawn copper pipe, ASTM B 306.

C. Polyvinyl Chloride (PVC) pipe, ASTM D 2665.

2.2 PIPE - ABOVE GRADE

A. Cast iron soil pipe, no-hub pattern, service weight, coated with coal-tar pitch varnish. Each piece of pipe shall be marked with weight and manufacturer's name and identification mark of Cast Iron Soil Pipe Institute, signifying compliance with ASTM A 888 and CISPI 301. Coupling joints shall comply with ASTM C564 and CISPI 310.

B. Type DWV hard drawn copper pipe, ASTM B 306.

C. Polyvinyl Chloride (PVC) pipe, ASTM D 2665.

2.3 FITTINGS

A. Cast iron soil pipe, hub and spigot and/or no-hub pattern, service weight, coated with coal-tar pitch varnish, each fitting be marked with weight and manufacturer's name and identification mark of Cast Iron Soil Pipe Institute, signifying compliance with ASTM A 74, ASTM A 888, and CISPI 301. Coupling joints shall comply with ASTM C564 and CISPI 310.

B. Copper Fittings, DWV:

1. Cast solder joint fittings in accordance with ANSI B16.23.

2. Wrought solder joint fittings in accordance with ANSI B16.29.

C. Polyvinyl Chloride (PVC) pipe: socket weld fittings, ASTM D 2665.

2.4 PIPING SPECIALTIES

A. Lead:

1. Sheet: Weight not less than four (4) pounds per square foot, conforming to Fed. Spec. QQ-L-201, Grade A.

B. Solder:

1. Lead Free Composition Sb5 (95% tin, 5% antimony).

2. Lead Free Composition 95.5% tin, 4% copper, 0.5% silver, Engelhard "Silvabrite 100".

3. Sil Fos

C. Solvent: Polyvinyl Chloride (PVC) solvent, ASTM D 2665.

2.5 CLEANOUTS

A. Floor Cleanouts:

1. Cast Iron with anchor flange and adjustable height housing, polished nickel bronze rim, scoriated floor plate with "CO" cast into the top surface, designed with countersunk screws for flush installation. Basis of Design: J.R. Smith 4000 Series.

B. Wall Cleanouts:

1. Brass plug with round stainless steel secured access cover. Basis of Design: J.R. Smith Figure 4422

2. Brass plug with square nickel-bronze frame and secured smooth stainless steel access cover. Basis of design: J.R. Smith Figure 4435

C. Exterior cleanouts:

1. Cast iron cleanout ferrule with anchor flange, outlet for push joint or no-hub connection, and countersunk brass cleanout plug. Basis of Design: J.R. Smith Figure 4280

PART 3 - INSTALLATION

3.1 GENERAL

A. Horizontal piping shall be run in practical alignment at a uniform slope of not less than one-quarter inch (1/4") per foot for three inch (3") pipes and smaller, and one-eighth inch (1/8") per foot for four inch (4") pipes and larger.

3.2 EXCAVATION AND BACKFILL

A. Provide in accordance with Division 2, SITE WORK, and in compliance with local plumbing codes.

3.3 SUPPORT

A. Provide support in accordance with local codes, but not less than as follows:

1. Horizontal Piping:

   a. Cast Iron Pipe: Support at intervals not exceeding ten feet (10') for hub and spigot pipe sections, on all horizontal soil, waste, drain and vent piping. Support at each turn and each fitting, and each connection.

   b. Copper DWV Pipe: For pipe sizes under 2". support at not more than six feet (6') wide intervals; for pipe sizes 2" and larger, support at not less than eight feet (8') wide intervals.

   c. Polyvinyl Chloride (PVC) Pipe: Support pipe at not more than five feet (5') wide intervals.

2. Vertical Piping: Secure piping at sufficiently close intervals to maintain alignment and support weight of the pipe and its contents. Support all stacks at their base and at regular intervals in the risers. Where structural elements are not available for support, secure pipe in its proper position by means of adequate bracing fastened to pipe.

3. Hangers shall be placed not more than eighteen inches (18") from each joint in run of pipe.

4. Support terminal ends of all runs or branches and each change of direction or alignment with an approved hanger.

5. Firmly secure all closest bends installed above grade.

3.4 JOINTS AND CONNECTIONS

A. General: Joints and connections shall be made permanently air, gas, and water tight.

B. Cast Iron Hub and Spigot Joints: Insert the spigot into hub after carefully cleaning both. Insert an oakum strand into joint sufficiently long to make three (3) turns around pipe and of a diameter that can be pressed into the joint by hand. Drive the oakum to the bottom of joint using a yarning iron, then pack solidly and evenly using a packing iron and hammer. Insert additional strands of oakum sufficient to fill the joint to within one-half inch (1/2") of the top and then pack with hammer and packing iron to form a uniform surface one inch (1") below top of the hub. Pour molten lead into the joint until it arches slightly above top of the hub. Allow lead to cool and drive it down at quarter points using a caulking iron. Caulk the joint on the inside and outside edges using one pound ball peen hammer and appropriate caulking irons.

C. Cast Iron No-Hub Joints:

1. Place neoprene sealing sleeve on end of one pipe and stainless steel shield and clamp assembly on the end of the other pipe. Firmly seat pipe ends against the integrally molded shoulder of the neoprene sleeve. Slide the shield and clamps into position over sleeve and tighten the stainless steel clamps alternately and firmly to approximately forty-eight inch-pounds of torque.

2. Provide thrust restraints on storm drain piping where change in direction exceeds 45 degree bends.

D. Copper Solder Joints: Cut pipe square using cutting tool. Remove all burrs using pipe reamer. Thoroughly clean outside of pipe and inside of fittings with sand cloth. Apply noncorrosive paste flux, fit joints, and apply heat and solder in accordance with manufacturer's instructions to complete joint.

E. Socket Joints: Cut piping square using pipe cutting tool. Remove all burrs using a pipe reamer or file. Thoroughly clean outside of pipe and inside of fittings with approved solvent. Apply approved cement and fit joints in accordance with pipe, fitting and cement manufacturer's recommendations.

F. Screwed Joints: Cut pipe square using pipe cutting tool. Remove burrs using pipe reamer. Cut a complete thread using sharp dies properly set and centered while applying oil graphite cutting lubrication. Fit pipe and thread together using a joint lubricant sealant or teflon tape.

G. Equipment Connections:

1. General: Connections to equipment shall be made in accordance with details on the drawings and the equipment manufacturer's installation instructions. Where incompatible piping materials come in contact, except for use of valves, isolate the two materials using dielectric isolators. Provide roughing materials and connect equipment under other sections of the specifications or by the Owner as indicated on the drawings, in the schedules, and as specified.

2. 2 Inches and Smaller: Shall be made with unions.

3. 2-1/2 Inches and Larger: Shall be made with flanges.

3.5 FLASHINGS

A. Provide proper flashing for pipes passing through roofing.

B. Flashings shall be of sheet lead with flanges not less than eighteen inches (18") square and with tubular sections extending over top of the vent and turned into top approximately one inch (1").

C. Vent extension shall stand approximately one foot (1') above roof.

D. Provide for expansion where lead turns into pipe.

3.6 TEST

A. Test piping systems prior to application of any insulation and prior to their being rendered inaccessible by the progress of the work.

B. All soil, waste, vent, and drain piping shall be inspected and tested in accordance with local codes.

C. Before the installation of fixtures, cap the ends of each system, fill the piping with water to the highest point, and allow to stand until a thorough inspection has been made. After the plumbing fixtures have been set and their traps filled with water, subject the entire sanitary system to a final air pressure test of not more than 1.0 inch of water column and a smoke or peppermint test. Perform the air and smoke test with an approved smoke testing machine which must shown a clear passage of smoke and air throughout the entire system. The entire system must be proven absolutely tight under such test.

End of Section

SECTION 22 33 00 RESIDENTIAL ELECTRIC DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.1 SCOPE

A. Provide residential electric point-of-use domestic water heater(s) of the size, capacity, and characteristics indicated on the drawings and specified herein.

B. Units shall be designed and U.L. listed for 120, 208, 240, 277, and 480 volt, single [three] phase electrical power, and shall have tank capacities of 10 to 40 gallons.

1.2 RELATION TO OTHER WORK

A. Refer to the Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

1.3 SUBMITTALS

A. Refer to the Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Provide complete data on: size, performance (including rating certification), electrical characteristics, controls, and accessories.

C. The data shall take the form of engineering data sheets, clearly depicting specification compliance, and a complete schedule worked up by unit number.

1.4 REGULATIONS, CODES, STANDARDS, AND ORDINANCES

A. Unit design shall be certified by the Underwriter's Laboratories to ANSI Standards for Household Electric Storage Tank Water Heaters UL 174.

B. System shall meet or exceed the energy efficiency requirements of ASHRAE Standard 90.1b-1992.

C. Units shall comply with HUD, BOCA, NAECA and current SBCCI Standard Plumbing Code requirements.

1.5 MANUFACTURER

A. Basis of Design: A. O. Smith, see drawings for model series

B. Equal products of Locinvar, Rheem, Ruud or AERCO International may be submitted for approval.

PART 2 - PRODUCTS

2.1 GENERAL

A. Unit shall be an electric water heater assembly with a water storage tank, electric resistance heater, factory packaged, complete with all safety and operating controls.

2.2 WATER STORAGE TANK

A. The water storage tank shall be designed for storage of heated potable water up to 180°F., shall be constructed in accordance with the ASME code for a minimum working pressure of 125 PSI. All internal surfaces of the tank exposed to water shall be protected with a glass lining fused to the steel tank.

B. Provide 3/4” threaded openings for inlet, outlet, relief valve, and top relief or outlet.

C. Tank shall have foam insulation with outer metal jacket finished in baked enamel, and shall have a full sized control compartment with access panel.

D. The water storage tank shall be warranted against leaks for a minimum of five years.

2.3 WATER HEATER

A. The water heater shall be designed for a choice of electrical power of 120V/1ϕ/60 Hz., 208V/1ϕ/60 Hz., 240V/1ϕ/60 Hz., 277V/1ϕ/60 Hz, or 480V/1ϕ/60 Hz. The heater assembly shall be listed by U.L.

B. The water heater shall have the following safety features:

1. Rigidly supported anode rod for maximum cathodic protection.

2. Complete glass lined tank with glass fused to steel.

3. Zinc plated copper sheath elements of screw-in design.

4. Thermostat with high temperature cut off.

C. Provide pressure-temperature relief valve selected and located in conformance with the requirements of ANSI 221.22 and per manufacturer's recommendations.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Unit shall be installed as indicated on the drawings, as recommended by the manufacturer, and in accordance with applicable codes.

B. Unit shall be installed on a 4” high housekeeping pad, or in a pre-manufactured drain pan designed to allow air circulation under the bottom of the unit.

C. Provide protection for relief valve against system expansion and contraction.

3.2 ELECTRICAL

A. All power, control, and interlock wiring shall be run in conduit.

B. All power wiring and conduit shall be performed as work of the Electrical Division of this specification.

C. All control interlock wiring and conduit will be provided by Mechanical Division in accordance with the Electrical Division of the specifications.

End of Section

SECTION 22 42 00 PLUMBING SPECIALTIES

PART 1 - SCOPE

1.1 GENERAL

A. Provide the plumbing fixtures and specialty items specified herein, with all necessary parts, fittings and appurtenances, to make a complete and operable plumbing system.

B. Plumbing Specialties:

1. Water Closets
2. Urinals
3. Lavatories
4. Sinks
5. Mop Basins
6. Electric Water Coolers
7. Floor Drains
8. Roof Drains
9. Hydrants

1.2 RELATION TO OTHER WORK

A. Refer to Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Refer to Section entitled POTABLE WATER PIPE, VALVES AND FITTINGS.

C. Refer to Section entitled SOIL, WASTE, VENT AND DRAIN PIPING SYSTEMS.

1.3 SUBMITTALS

A. Submit data on all fixtures, accessories, and appurtenances.

B. Where compliance with an industry, society, or association standard is specified, submit proof of such compliance.

1.4 MANUFACTURERS

A. Basis of Design for fixtures is American Standard.

B. Kohler, Eljer, and Crane are alternate acceptable manufacturers. Other manufacturers must be submitted for approval.

C. Specialty manufacturers used as basis of design are noted with the specification for the specialty.

PART 2 - PRODUCTS

2.1 WATER CLOSETS, FLOOR MOUNTED, FLUSH VALVE TYPE

A. Water Closet, Floor Mounted, Mark P-1A – Refer to Plumbing Fixture Schedule.

B. Handicap Water Closet, Floor Mounted, Mark P-1B – Refer to Plumbing Fixture Schedule.

2.2 URINALS (UR), P-2

A. Urinal, Wall Hung, Washout, Mark P-2A – Refer to Plumbing Fixture Schedule.

B. Urinal, Wall Hung, Washout, Mark P-2B – Refer to Plumbing Fixture Schedule.

2.3 LAVATORIES, MARK P-3

A. General: Lavatories in public facilities shall comply with the requirements of the Florida Energy Efficiency Code by being equipped with outlet devices which limit the flow of hot water to a maximum of 0.5 GPM; or, except for handicapped fixtures, being equipped with self-closing valves that limit delivery to a maximum of 0.50 gallons of hot water on a non-recirculating system, or 0.25 gallons of hot water on a recirculating system; or, the lavatories shall be equipped with devices which limit outlet temperature to a maximum of 110oF, or water heater thermostats shall be set for 110oF. Lavatories with cold water only to have the cold water piping connected to the hot and cold water connection of the faucet.

B. Lavatory, Wall Hung, Mark P-3A – Refer to Plumbing Fixture Schedule.

2.4 SINKS, MARK P-4

A. Sink, Single Compartment, Kitchen, Mark P-4A – Refer to Plumbing Fixture Schedule.

B. Sink, Double Compartment, Conference Room, Mark P-4B – Refer to Plumbing Fixture Schedule.

2.5 MOP BASINS, MARK P-5

A. Mop Basin, Molded Stone, P-6 – Refer to Plumbing Fixture Schedule.

2.6 ELECTRIC WATER COOLERS, MARK P-6

A. Handicap Electric Water Cooler, Dual Level, Flush Mount, Mark P-6 – Refer to Plumbing Fixture Schedule.

B. Provide complete one year warranty against failure in materials or workmanship on entire water cooler, and additional four year warranty on the sealed refrigeration system. A copy of the Manufacturer's warranty shall be included in the O&M manual.

2.7 FLOOR DRAINS

A. Toilet Room Floor Drains: Wade W-1100 coated cast iron drain with two piece body, reversible clamping collar, 1/2" trap primer tapping, weep holes, bottom outlet no hub or inside caulk, and adjustable 6" diameter nickel bronze strainer. The drain top shall be "NB" finish. Provide deep seal P-traps.

B. Equipment Room Floor Drain: Wade W-1100-ER coated cast iron drain with two piece body, reversible clamping collar, weep holes, bottom outlet no-hub or inside caulk, and adjustable 6" round nickel bronze strainer. Equipment Room floor drains shall have deep seal P-traps. Provide 6” diameter funnel for cooling coil condensate drains where applicable.

C. Acceptable: Wade; Zurn; Smith.

D. Trap Primer: Precision #P-2, or equal.

2.8 ROOF DRAINS

A. Roof Drain: Roof drains (RD) shall be equal to Wade-3010 cast iron roof drain with adjustability for insulation thickness, flange, flashing ring with gravel stop, and vandal proof mushroom dome.

B. Overflow Roof Drain: Same device as roof drains mounted at different location on roof.

2.9 HYDRANTS (HOSE BIBBS)

A. Wall Hydrants: Wade W-8604-L6 3/4", nickel bronze finish w/loose key stop and vacuum breaker.

B. Sidewalk Hydrant: Wade W-8609-L2 3/4", nickel bronze box w/loose key handle and vacuum breaker.

C. Roof Hydrant: Wade W-8610-L2 3/4", non-freeze post hydrant with cast aluminum housing, straight inlet connection and bronze casing.

PART 3 - INSTALLATION

3.1 FIXTURES

A. Connect to sanitary piping with copper waste arm bends. Flanged type fixture joints shall be made tight by use of molded gasket of graphite, having proper thickness and shape. No putty or cement will be permitted.

B. Fixtures identified as for the handicapped shall be installed in accordance with the Federal Rules of the American Disabilities Act (ADA), and the Accessibility Requirements Manual of the Department of Community Affairs, Florida Board of Building Codes and Standards. These include, but are not limited to, the following:

1. Water Closets:

2. Seat height at 17 to 19 inches above floor.

3. Toilet centerline a minimum of 18" from closest wall, and 42" from the edge of the lavatory.

4. Flush control shall be on the opposite side of the toilet from the closest wall, and no more than 44" above the floor. Control mechanism shall require maximum 5 pounds pressure to activate.

C. Urinals:

1. Wall hung type urinal lip shall be not more than 17" above the floor.

2. Control mechanism shall require maximum 5 pounds pressure to activate.

D. Lavatories:

1. Lavatory bottom must be a minimum of 28" above the floor, and the rim of the fixture no higher than 34".

2. Faucets shall be lever action or push type, and shall require no more than 5 pounds to activate.

3. Insulate hot and cold supplies, and drain, to protect handicapped against physical impact and temperature burns, in accordance with ADA art. 4.19.4.

E. Water fountains and coolers:

1. Spout height shall be no more than 36" above the floor, with no less than a 4" high water stream.

2. Unit shall provide clear knee space at least 27" high, 30" wide, and 17" to 19" deep; or, provide 48" by 30" clear space in front of unit parallel to wall.

3.2 TRAPS

A. Shall be self-cleaning. Unless otherwise indicated, each fixture shall be separately trapped with a water seal trap placed not more than 18 inches from the outlet. No fixture shall be double trapped.

3.3 DRAINS

A. On all floor and roof drains provide sheet lead apron cut to fit the flashing clamp and sized to extend 8 inches beyond flash rim of the drain.

3.4 EQUIPMENT

A. Install in accordance with manufacturer's recommendations and as indicated on the drawings or specified in this section.

3.5 ELECTRICAL

A. All power, control, and interlock wiring shall be run in conduit.

B. All power wiring and conduit shall be performed as work of the Electrical Division of this specification.

C. All control interlock wiring and conduit will be provided by Mechanical Division in accordance with the Electrical Division of the specifications.

3.6 HYDRANTS

A. Wall Hydrants: Mount wall hydrants at a height of eighteen inches (18") above grade level, unless otherwise indicated.

B. Sidewalk Hydrants: Where no sidewalks are indicated, locate in 24" x 24" x 4" concrete pad installed level with the finished grade.

End of Section

Project Manual

EXCERPT INCL DIVISION 23 HVAC

BID NUMBER – BID-SJR-06-2018

Renovation with Addition To Building V, St. Augustine Campus

2990 College Drive
St. Augustine, Florida 32084

TO BE CONSTRUCTED FOR:

ST. JOHNS RIVER STATE COLLEGE

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SECTION 23 00 00 COMMON REQUIREMENTS FOR MECHANICAL WORK

PART 1 - GENERAL

1.1 SCOPE OF DIVISION

A. Work Description: Work shall include all materials, equipment and labor necessary for a complete and functioning Plumbing installation in accordance with local and state codes, and contract drawings and specifications. Work shall be understood to include all work specified in Division 23, Mechanical, inclusive, of the specifications.

B. Regulations, Codes, Standards and Ordinances:

1. Florida Building Code – Building, 2017 Edition.

2. Florida Building Code – Mechanical, 2017 Edition.

3. Florida Building Code – Plumbing, 2017 Edition.

4. National Fire Protection Code, Standard for Installation of Air Conditioning and Ventilating Systems, NFPA-90A.

5. National Fire Protection Code, Life Safety Code, NFPA-101.

6. American National Standards Institute (ANSI) B 9.1 (Safety Code for Mechanical Refrigeration).

7. American Refrigeration Institute (ARI) Standards for Refrigeration Apparatus.

C. Refer to other Divisions for continuation of exterior work and allied work.

D. Obtain and pay for all required Plumbing permits, fees and inspections.

1.2 DRAWINGS

A. Architectural and structural drawings take precedence over Mechanical drawings with reference to the building construction. Mechanical drawings are diagrammatic and indicate the general arrangement and extent of work. Architectural drawings indicate more exactly the desired relationship between diffusers, registers, lighting fixtures, equipment, electric panels and devices, plumbing fixtures, and other items which remain exposed in the completed building.

B. Exact locations and arrangements of materials and equipment shall be determined, with the approval of the Engineer, as work progresses to conform in the best possible manner with the surroundings and with the adjoining work or other trades.

C. Where locations of equipment, devices or fixtures are controlled by architectural features, establish such locations by referring to dimensions on Architectural (A-series) drawings and not by scaling drawings.

1.3 COORDINATION OF WORK

A. Coordinate all work, prior to installation, with work of other trades and with architectural and structural features to preclude interference between the work of different trades and to insure necessary clearances at crossovers and equipment. Work requiring necessarily fixed locations (e.g.; piping with required slopes, lighting fixtures and diffusers in ceilings, etc.) takes precedence over work not requiring such fixed locations and shall establish permissible routing of services associated with the latter.

B. Should work be performed without adequate coordination so that interference occurs between works of different trades, the Contractor shall eliminate such interference by requiring necessary rework by the trades involved. Such rework shall meet express approval of the Engineer and shall be performed at no addition to contract amount.

1.4 DISCREPANCIES

A. Refer to GENERAL REQUIREMENTS or GENERAL CONDITIONS.

B. Refer all discrepancies in writing to the Engineer for resolution.

1.5 SUBMITTALS

A. Material List: Within twenty (20) days of award of contract, submit to Engineer for approval a complete list of materials to be provided for the Mechanical work. The list shall include supplier's names and manufacturer's names and number or series for each item on list. Items not shown on said list shall be construed to be as specified on drawings or in specifications.

B. Product Submittals: Submit to Engineer for approval, before commencing work, manufacturers data for all Mechanical materials and equipment to be provided under this contract. Data shall clearly show compliance with specifications and scheduled data on drawings. In addition, submit drawings or diagrams, dimensioned and in correct scale, requested by Engineer or specified in individual sections, to clarify the work intended or to show its relationship to adjacent work or work of other trades. Contractor is responsible for any delays in job progress occurring directly or indirectly from late submissions. Submittals shall clearly show the following:

1. Technical and descriptive data in detail equal to or greater than the data given in the item specification. Indicate all characteristics, special modifications and features. Where performance and characteristic data is shown on the drawings or specified, submitted data shall be provided in a degree which shows that the item is equal to that specified and shown.

2. All exceptions to, or deviations from, the Contract Documents.

3. Stamp: Indicate on each submittal that Contractor has checked that it complies with the drawings and specifications by affixing a stamp indicating the following: Date, specification page and section, drawing note indicating that manufacturer is as specified or that manufacturer is to be approved as "or equal", and signature of person reviewing the submittal.

C. Samples: Submit to Engineer for approval samples of materials as indicated elsewhere in these specifications. Samples shall duplicate materials, workmanship, and finish of products intended for installation.

1.6 RECORD DRAWINGS

A. Refer to GENERAL REQUIREMENTS or GENERAL CONDITIONS.

B. Contractor shall provide neatly annotated drawing prints showing all changes and deviations made in the installation of the work to the Engineer.

C. The Engineer will make the indicated changes to the original CAD drawings, and will label and date them as “RECORD DRAWINGS”.

1.7 GUARANTY (WARRANTY)

A. Contractor shall warranty all Mechanical work under this Division for a period of one year from the date of beneficial occupancy by the Owner. This warranty shall include both materials and labor required to repair or replace any defective material or equipment.

B. When refrigerant systems are included in the work of this contract, the Contractor shall provide an additional four year extended warranty beyond the basic one year warranty on the entire refrigerant system(s) which shall include parts, refrigerant and oil, but exclusive of labor. The refrigerant system is defined as all components in contact with refrigerant.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. All materials and equipment shall be new and without blemish or defect. Equipment and materials shall be products which meet the requirements of these drawings and specifications. Where acceptance is contingent upon having the product examined, tested and certified by a recognized testing laboratory, the product shall be so examined, tested and certified, with documentation included in the product submittal. Where no special indication as to the type or quality of material or equipment is indicated, a first class standard article shall be furnished.

B. All equipment of one type specified in one section of these specifications, shall be the products of one manufacturer, unless specifically indicated otherwise. Substituted equipment or optional equipment where permitted and approved, must conform to space requirements. Substitutions of Mechanical equipment for

that shown on the schedules or designated by model number in the specifications will not be considered if the item is not a regular cataloged item shown in the current catalog of the manufacturer. Any substituted equipment that cannot meet space requirements, whether approved or not, shall be replaced at the Contractor's expense. Any modifications of related systems as a result of substitutions shall be made at the Contractor's expense.

C. The approval of submittals does not assure that the Engineer, or any Owner's Representative, attests to the dimensional accuracy or dimensional suitability of the material or equipment involved or the ability of the material or equipment involved or the Mechanical performance of equipment. Approval of submittals does not invalidate the plans and specifications if in conflict, unless a letter requesting such change is submitted and specific approval is provided on the Engineer's letterhead.

D. Operating conditions and capacities must be as follows:

1. No overloading

2. No operation at conditions outside of maximum and minimum limits recommended by the manufacturer and approved by the Engineer.

3. Compatible with all systems.

4. Performance as delineated in schedules and in the specifications shall be interpreted as minimum performance.

E. Unless otherwise specified, all equipment and materials furnished must be as follows:

1. Recommended by the manufacturer for the application.

2. Installed in accord with the manufacturer's recommendations for the application.

F. It is the intent of these specifications that wherever a manufacturer of a product is specified, and the terms "other approved" or "or approved equal" or "equal" are used, the substituted item must conform in all respects to the specified item. The above terms are implied wherever practical and the quality of performance and equipment is not jeopardized. These terms are not restricted to the names in the specifications since the intent is to achieve a broad spectrum of interested bidders and vendors. Where the term "Acceptable:" is used; only those manufacturers and/or products listed as acceptable may be submitted.

2.2 REJECTED WORK

A. Any work rejected by Engineer because it does not conform to specifications shall be removed immediately and replaced properly.

2.3 SLEEVES

A. General: Lay out work and set sleeves in new or existing construction so there shall be a minimum of cutting, drilling and patching. All sleeves not used during construction period shall be sealed using grout. Unused penetrations or sleeves through fire rated barriers shall be sealed to prevent a passage of smoke or heat using an underwriters Laboratories approved method rated at least equal to the barrier penetrated. Submit proposed method with proof of UL approval with other submittals.

B. Pipe Sleeves:

1. Walls and Partitions:

a. Exterior Walls (Above Grade): Sleeves shall be mild steel pipe or plastic sleeves built into wall, partition or beam, sized to pass pipe and covering, leaving a clear space of 1/4-inch minimum between covering and sleeve. Penetrations of fire rated barriers shall have mild steel sleeves.

b. Exterior Walls (Below Grade): Schedule 40 steel hot dipped galvanized after fabrication or cast iron sleeve with 1/4-inch x 3-inch center flange (water stop) around the outside.

c. Interior Walls: Sleeves shall be mild steel pipe or plastic sleeves built into wall, partition or beam, sized to pass pipe and covering, leaving a clear space of 1/4-inch minimum between covering and sleeve. Penetrations of fire rated barriers shall have mild steel pipe sleeves.

d. Floors (Above Grade): Sleeves shall be 14 gauge galvanized sheet steel or plastic, set before floor is poured, sized to pass pipe and covering, leaving a clear space of 1/4-inch between covering and sleeve, and shall extend 1/2-inch above finished floor.

C. Duct Sleeves: Sleeves or openings sized to pass Mechanical ducts and covering shall be of framed construction in roof, wall, or partitions.

D. Sealing of Sleeves:

1. Sleeves Below Grade: Caulk annular space between pipe and sleeve using oakum and poured lead both sides minimum one inch to make wall penetration water tight.

2. Sleeves Above grade: Openings around pipes, duct, etc., passing through sleeves shall be made draft free and vermin-proof by packing solidly with mineral wool or fiberglass. Sleeves in exterior walls shall have outside surface of packing sealed with a weatherproof non-hardening sealant.

3. Sleeves through Fire Rated Barriers: Openings around pipes, etc., through fire rated barriers shall be sealed using a UL approved method rated at least equal to the wall or floor being penetrated.

2.4 FLOOR, WALL AND CEILING PLATES OR ESCUTCHEONS, IN EXPOSED AREAS

A. Provide escutcheons or fabricated plates or collars at each location where pipe or duct passes through a finished surface. Escutcheons for flush sleeves shall be equal to Benton & Caldwell No. 3A chromium plated brass; for sleeves extending above floor shall be equal to Benton Caldwell No. 36 chrome plated brass.

B. Collars or plates for ducts and larger diameter insulated pipe shall be fabricated of 18 gauge galvanized copper hearing sheet steel, secured to structure and neatly fitted around duct or pipe.

2.5 ACCESS DOORS

A. Provide as necessary for access to concealed valves, cleanouts, unions, expansion joints, dampers, coils, junction boxes, etc., where no other means of access is shown or specified.

B. Door shall be manufactured by the Milcor division of Inland-Ryerson, or an acceptable equal, type as follows:

Door Location	Door type
Drywall	Style "DW"
Masonry or tile	Style "M-Stainless"
Acoustical tile	Style "AT"
Plaster	Style "K"
Fire-rated walls	Style "Fire Rated"

C. Each door shall be equipped with two flush, screwdriver operated, cam latches as a minimum. Hinged doors shall be provided whenever possible. Doors, other than Style "M", shall be finished to match adjacent surface. Door sizes shall be applicable to the access required for normal service.

2.6 ELECTRICAL

A. General: Unless specifically specified otherwise, motors, starters, and control devices shall be furnished under the section of specifications that covers driven equipment.

B. All electrical power wiring, conduits, and connections shall be provided under the Electrical Division.

C. All control and interlock wiring, and conduit, shall be provided by Mechanical Division in accordance with the Electrical Division of the specifications.

D. Contractor furnishing driven equipment shall coordinate wiring diagrams with contract requirements and shall furnish coordinated wiring diagrams for installation.

E. Motors: Unless specifically noted otherwise in the Section covering the driven equipment (or the equipment drives), motors shall comply with the following:

1. Three Phase: NEMA design B, three-phase, squirrel cage induction type designed for 1800 rpm synchronous speed for operation in 40 degrees C ambient at 1.15 service factor at constant speed on the scheduled voltage. Motors shall be insulated with Class B insulation material and shall be cast iron, drip proof, horizontal foot mounted type with ball bearings. Two speed motors shall be provided as scheduled and shall be two winding type. Motors shall be high-efficiency type.

2. Single Phase: Squirrel cage induction type designed for 1800 rpm synchronous speed for operation in 40 degree C ambient at 1.15 service factor at constant speed on the scheduled voltage. Motors shall be insulated with Class B insulation materials and shall be two winding capacitor start type with steel enclosure, drip proof, horizontal foot mount and ball bearings.

3. Scheduled Horsepowers: The horsepowers scheduled or specified are those nominal sized estimated to be required by the equipment when operation at specified duties and efficiencies. In the case of pumps, these horsepowers are non-overloading and may also include provisions for future planned impeller changes. If the actual horsepower for the equipment furnished differs from that specified or shown on the drawings, it shall be the Contractor's responsibility to insure that proper size feeders, breakers, starters, etc. are provided at no change in contract price.

4. Motor Efficiency Requirements:

Motor HP	Standard Eff	Hi Eff ODP
0.5	71.0	-
0.75	76.8	-
1.0	79.0	82.5
1.5	79.0	84.0
2.0	80.7	84.0
3.0	81.5	86.5
5.0	84.0	87.5
7.5	82.9	88.5
10.0	85.6	89.5
15.0	89.5	91.0
20.0	87.5	91.0
25.0	87.1	91.7
30.0	88.3	92.4
40.0	90.2	93.0

5. Starters: Shall be provided as work of Division 23 and shall meet the requirements of the Electrical section entitled "Starters". Refer to the section entitled "Variable Frequency Drives", if provided, for additional information on electric motors.

2.7 BELT DRIVES

A. Equip each motor driven machine (not direct connected) with V-belt drive. Belts shall be of correct cross section to fit properly in sheave grooves and shall be carefully matched for each drive. Sheaves shall be cast iron or steel, bored to fit properly on shafts and secured with keys of proper size. The rating of each drive shall be as recommended by manufacturer for service but shall be at least 1.5 times nameplate rating of motor.

B. Fan Belt Drives: Variable and adjustable pitch sheaves shall be selected so that required fan RPM will be obtained with sheave set approximately in mid-position. Fans shall have drives in accord with the following table:

Output (Horsepower)	Fan Speed Motor (RPM)	Sheave Type
0 to 10	Up to 1800	Variable Pitch
15 and up	Up to 1800	Fixed Pitch
0 to 3	1801 and up	Variable Pitch
15 and up	1801 and up	Fixed Pitch

C. Speed adjustment: Adjust fan speed as necessary to obtain proper design air flow with fan in its installed location. Fans which are to have fixed pitch drives may be first fitted with variable pitch drives until proper speed adjustment is made and then may be fitted with proper fixed pitch drive size, or alternate sizes of fixed pitch drives may be used until proper fan speed is obtained. Provide all drives necessary to obtain proper fan speed needed to deliver necessary air quantity.

D. Vibration of Central Station Air handling Units: Field vibration levels will not be acceptable if the maximum vibration velocity or displacement measurement exceeds the following values (when measurements are taken at the bearing supports of central station air handling units using a vibration analyzer with the filter set at the operating fan speed):

Fan Speed (RPM)	Maximum Vibration Level
800 or Less displacement	5 Mills (0.127 mm) max.
801 and Greater velocity	0.20 in/sec. (5mm/s) max.

2.8 BELT AND COUPLING GUARDS

A. Each belt drive shall be equipped with a guard. Guards shall be constructed of substantial sheet metal or not less than #18 U.S. standard gauge. Braces or supports must not "bridge" sound and vibration isolators. Guards shall be designed with adequate provision for movement of motor required to adjust belt tension. Means shall also be provided to permit oiling, use of speed counters, and other maintenance and testing operations with guard in place.

B. All direct drive equipment shall have coupling guards in accordance with OSHA.

2.9 DIAGRAMS, NAMEPLATES AND LABELS

A. Each major component of equipment shall have the manufacture's name, address and catalog number on a plate securely affixed in a conspicuous place. The nameplate of a distributing agent will not be accepted.

B. In areas having equipment, valves and control devices, provide single line diagrams in Operation and Maintenance manuals. The diagrams shall give name, number designation, and location of each piece of equipment, valve, and control device.

C. All pieces of equipment, valves, starters, disconnects, and all control instruments and apparatus shall be identified with 1/16 inch thick black laminated plastic nameplate with 3/16 inch high white laminated letters. Similar and like equipment shall be designated with numerical suffix (example: THERMOSTAT, T-1). The nameplate identification shall coincide with items appearing on diagrams.

D. All labels shall be securely affixed.

2.10 PAINTING AND MARKING

A. Painting: Painting of equipment, pipe, and ducts (insulated or uninsulated) is specified under the "Painting" Division of these specifications.

B. Touch-up of shop coat shall be performed under section furnishing equipment.

2.11 HOUSEKEEPING PADS

A. Provide six inch (6") high reinforced concrete (#10 mesh with 1-1/2" top cover) housekeeping pad for each piece of floor or grade-mounted equipment, unless shown otherwise on the drawings.

B. The housekeeping pad shall extend six inches (6") beyond the equipment in all directions and shall be continuous beneath the base.

C. Pads shall have chamfered edges and shall be poured and finished smooth and level to insure proper and continuous support for the equipment base bearing surfaces.

D. Provide embedded anchor bolts to suit equipment base and grout all bearing surfaces true prior to securing base to housekeeping pad.

PART 3 - INSTALLATION

3.1 INSTALLATION AND WORKMANSHIP

A. The work shall be performed by qualified mechanics and all materials, apparatus and equipment shall be installed in neat, workmanlike manner. Any material, apparatus or equipment which, in the opinion of the Engineer, is improperly installed shall be removed and reinstalled in an approved manner at no additional cost to the client.

B. The work shall be coordinated with the work of other trades. Where the work is dependent upon work of other trades or work already in place, such other work and work in place shall be examined and shall be in proper condition and state of completion before continuing the installation.

3.2 STORAGE OF MATERIALS

A. Use of site for storage of materials shall be in accordance with the GENERAL CONDITIONS and such other provisions of these Contract Documents that may limit or restrict use of the project site.

B. The Contractor shall protect all materials and equipment from the time of receipt until the time of building acceptance by the Owner. Material and equipment shall be protected at all times from physical damage and from the effects of weather and humidity. Materials and equipment that are to be installed indoors should be stored indoors if possible. Coordinate the installation of the material and equipment with related work and finishing of adjacent surfaces to prevent damage to the equipment or adjacent finishes. Replace or repair to the Engineer's satisfaction any damaged equipment

3.3 EXCAVATION AND BACKFILL

A. Refer to Division 2 – SITEWORK

B. Provide as necessary to accomplish work specified. Perform in accordance with applicable State and Local codes and accepted good practice.

3.4 PROTECTION OF WORK UNTIL FINAL ACCEPTANCE

A. Contractor shall protect all materials and equipment from damage, the entrance of dirt and construction debris from the time of installation until final acceptance.

B. Any materials and equipment that has been damaged shall be repaired to "as new" condition, or replaced at the direction of the Engineer. Where factory finishes occur and damage is minor, finishes may be touched up. If, in the opinion of the Engineer the damage is excessive, factory finish shall be replaced to "new" condition.

3.5 TEST

A. General: All systems shall be inspected, tested, given a trial run, and demonstrated to Engineer's and Owners satisfaction that they are complete, operational, and ready for use.

B. Piping; unless required otherwise by code or other divisions of specifications, piping shall be tested at pressure of one hundred fifty percent (150%) of normal working pressure. Contractor shall valve off or otherwise isolate all equipment from piping pressure test so as to prevent damage to the equipment.

3.6 INSTRUCTION AND MAINTENANCE MANUALS

A. Refer to the Section entitled OPERATION AND MAINTENANCE MANUALS.

B. Refer to individual sections for instruction requirements.

3.7 ACCEPTANCE

A. Prior to requesting final inspection:

1. Complete all work required by drawings and specifications.

2. Provide test and balance report to Engineer at least two (2) days prior to time of final inspection.

3. Contractor shall furnish necessary mechanics, furnish test instruments and equipment as required to make necessary adjustments, and to assist with the final inspection.

4. Acceptance will be made by Engineer on the basis of tests and inspection of project.

End of Section

SECTION 23 00 02 MECHANICAL DEMOLITION

PART 1 - GENERAL

1.1 SCOPE

A. Section includes requirements for mechanical demolition/removal work in this project. Work includes, but is not limited to, the following:

B. Mechanical demolition work does not include:

1. Demolition/asbestos removal.

2. Site preparation/clearing.

3. Structure modifications.

1.2 RELATED DOCUMENTS:

A. Work specified herein is included in the base contract work.

B. Work specified herein may depend or be affected by other provisions of the Contract Documents. Review to ascertain thorough understanding and coordinate as required. Specific reference is made to the following:

1.3 DEFINITIONS

A. Demolition/removal shall include demolition indicated or required to make way for new work, possibly to include but not limited to, the following:

B. It may include salvage, storage, disposal, securing, protecting, re-routing, temporary work, and coordination of maintaining operative portions of the facilities during the work.

1.4 SUBMITTALS

A. General:

1. Submittals required by this Section are listed hereinafter.

2. All qualifications and product sources shall be submitted concurrently unless review sequencing dictates otherwise.

3. For additional data on submittals and method refer to Division 1.

B. Demolition Plan and Schedule of Work: Submit not less than 5 days prior to pre-demolition meeting.

PART 2 - PROVISIONS

2.1 QUALITY ASSURANCE PROVISIONS

A. Ascertain that those involved in the work are knowledgeable of scope, expected results and experienced or trained in all aspects of the demolition to which assigned.

B. Regulatory Requirements: Refer to Division 1.

C. Contractor shall prepare graphically and/or in writing a demolition plan and schedule responding to at least the following:

1. Construction schedule and demolition plans and schedules related thereto.

2. Demolition Procedures: Dirt, dust, debris and noise to be expected and plans for control and removal.

3. Proposed on-site haul route(s) and means to control and keep clean.

4. On-site haul route(s) and means to control and keep clean.

5. Coordination plans with governmental agencies relative to haul routes off-site, and the hauling and disposal of debris.

6. Coordination plans with separate sub-contractors.

7. Coordination plans with Owner where continued occupancy is required.

8. Barrier, protection and security plans.

9. Removal, protection and delivery procedures for items to be Contractor-removed (salvaged) and stored for subsequent Contractor re-installation.

10. Removal, protection and delivery procedures for items to be Contractor-removed (salvaged) and delivered to Owner.

11. Method and means to leave required utilities, other systems, etc., operative until "Permanently" activated or de-activated.

12. Contractor shall substantiate that all portions of plan are workable and that concurrence of governing authorities has been obtained.

D. Pre-demolition Meeting: A meeting to coordinate demolition, discuss demolition plan, and schedule of work shall be held. It may be held concurrently with Pre-Construction Meeting. Meeting shall be held prior to beginning of any demolition work. Attendance shall include:

1. Architect/Engineer

2. Owner

3. Contractor's Superintendent

4. Superintendent of Subcontractors or others that will be involved in demolition

5. Others as may be requested or desire to attend

E. A/E and Owner will:

1. Review plan and schedule advising Contractor accordingly.

2. Advise of location(s) for contractor delivery of salvaged items to be Owner stored.

F. Demolition work shall not start until plan and schedule are acceptable to Owner and A/E.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Refer to Division 1 for additional requirements applicable to execution of the work.

B. Work forms a substrate for subsequent work of other trades. Determine quality control requirements of subsequent trades and work thereto.

C. Public and site utilities, and other systems or services known to exist are indicated. Others may exist. Exact locations are unknown and conditions other than indicated or implied may exist. Contractor is warned to proceed with caution at all times. Owner(s) of known or discovered utility(s) shall be notified prior to beginning or continuing work (upon discovery) to gain further information as to location, extent, installation conditions and to coordinate work involving such. Should emergencies involving existing utilities or services occur, Contractor shall immediately notify utility Owner(s) and proper authority and shall implement corrective action to limit of his capability.

D. Ascertain items to be protected are identified.

E. Ascertain that demolition does not result in damage to structural members.

3.2 PREPARATION

A. Provide barriers, protection and security from demolition work for property and person. [Barbed wire, razor wire, or similar types of materials will not be used.]

B. Ascertain items to be removed, stored or salvaged are properly removed, protected and delivered. Items to be Contractor stored shall remain Contractor's responsibility to protect until re-installation. Items to be removed from the site become the property of the contractor.

C. Control dirt, dust, debris and waste accumulation.

3.3 ERECTION/INSTALLATION/APPLICATION

A. Perform demolition required. Remove debris, waste, etc. from site as accumulated.

1. Use of explosives or burning is prohibited.

2. Maintain continuity of required utilities, other systems, etc., while work is being performed through use of approved temporary means.

3.4 ADJUSTING/CLEANING/PROTECTION

A. Items/surfaces not intended to be removed or which become damaged by demolition shall be repaired/replaced by Contractor.

B. All debris and waste shall be removed from site.

End of Section

SECTION 23 05 29 HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 SCOPE

A. Provide all angles, brackets, clamps, anchors, inserts, rods, braces, frames, hangers, nuts and bolts, and other miscellaneous steel and hardware items as may be required for the proper support of equipment and piping systems.

1.2 RELATION TO OTHER WORK

A. Refer to the Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Refer to other sections for special requirements relating to specific equipment and systems.

1.3 INDUSTRY STANDARDS

A. Hangers and supports specified by "type" herein shall be designed and manufactured in accordance with the Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Publication SP-58.

B. Hangers and supports specified by "type" herein shall be selected and applied in accordance with MSS Publication SP-69.

PART 2 - MATERIAL

2.1 HANGERS

A. Pipe hangers shall have manufacturer's standard finish except that hangers in contact with copper piping shall be plastic coated.

1. Pipe 3 Inches and Larger: MSS Type 1. 260.

2. Pipe 2-1/2 Inches and Smaller: MSS Type 7, 10.

2.2 ISOLATORS

A. As specified in other sections.

2.3 PIPE CLAMPS

A. Shall be MSS Type 8. Clamps in contact with copper pipe shall have contact area plastic coated.

2.4 INSULATION SHIELDS

A. Shall be MSS Type 40.

2.5 BEAM CLAMPS

A. Shall be MSS Type 29.

2.6 INSERTS

A. Preset Type: Malleable iron with removable interchangeable nuts having lateral adjustment of not less than one and five-eights inch. Continuous inserts shall have a capacity of 2000 lb. per foot and shall be hooked over reinforcing. Acceptable: C-B Universal Fig. 282; Unistrut Products Co., P-300; Brinkley B-32-1.

B. After Set Type: Self-drilling style expansion shells shall be used in concrete and brick. Toggle bolts shall be used on block walls and partitions. Acceptable: Phillips Drill Co. "Red Head"; Raul "Saber Tooth" and "Spring Wings".

C. Power Actuated After Set Features: Pin and stud anchors shall have a withdrawal resistance four times the indicated load. Acceptable: Hilti Fastening Systems, Hilti, Inc.; Ramset Fastening Systems, Olin Corp.

2.7 ROD

A. Carbon steel, black threaded both ends or continuous thread, sized with safety factor of five (5). Acceptable: Grinnell Fig. 140 or 146.

PART 3 - INSTALLATION

3.1 GENERAL

A. Hang piping and equipment from preset inserts except where unforeseeable conditions necessitate additional hangers whereupon after set inserts may be used subject to Engineer's approval.

B. All inserts, fasteners, hangers and supports shall be installed in strict accordance with manufacturer's instructions.

3.2 PIPE

A. Hangers shall be spaced to prevent sag and to permit proper drainage. All piping shall be run parallel with the lines of building, unless otherwise indicated on drawings.

B. The hanger spacing and placement shall be such that after the covering (insulation and finish) is applied there will be not less than 1/2 inch clear space between finished covering and other surfaces including the finished covering of parallel adjacent pipes.

C. Refer to sections on specific piping systems for maximum spacings on hangers and to MSS publication SP-69.

D. Copper pipe shall have plastic coated hangers and/or supports. Insure that no steel-to-copper contact occurs in the support system.

3.3 EQUIPMENT

A. Equipment supports shall be as otherwise indicated on the drawings, and recommended by the equipment manufacturer.

3.4 DUCTWORK

A. Refer to the Section entitled DUCTWORK.

3.5 SPRAY FIRE PROOFING

A. Where spray fire proofing occurs, install hangers before application of such treatment and withhold installation of ducts, piping, air distribution equipment and like items, until after application.

3.6 POWDER ACTUATED FASTENERS

A. Powder actuated tools shall be used only by qualified operators in accordance with recommendations prepared by Powder Actuated Tool Manufacturer's Institute.

B. Fasteners shall not be of such size and spacing as to create objectionable stress in concrete.

C. Powder actuated fasteners shall not be used on exterior surfaces or where exposed to moisture.

D. Powder actuated tools shall not be used on projects where their use is prohibited by the General Conditions or other provisions of the Contract Documents.

3.7 STEEL DECKING

A. On projects where floor or roof slabs are installed over steel decking, drill or punch web of steel decking and insert hangers with washers before the concrete fill is poured in place.

B. Hangers shall be plumb within one-half inch (1/2") in four feet (4') and spaces as required for service intended.

C. Where unforeseeable conditions necessitate additional hangers, install self-drilling or powder actuated inserts, subject to approval of the Engineer.

D. Inserts shall not be installed in a location or manner or of a size that might compromise the waterproofing of the structure.

3.8 CONCRETE BEAMS AND TEES

A. Inserts installed in re-enforced concrete beams or tees shall be located so as not to weaken the member. General, locate inserts near the center of the vertical dimension of the beam or tee.

3.9 DRAWINGS

A. See drawings for special details on specific hangers and/or supports.

End of Section

SECTION 23 05 29 TEST AND BALANCE

PART 1 - GENERAL

1.1 SCOPE

A. Provide the services of a qualified technician to test, balance, and attest the performance of the complete heating and air conditioning system provided as work of this contract, including the following:

1. Air Handling Units.

2. Fan Coil Units.

3. Fans.

4. Ductwork and Air Distribution.

5. Chilled Water Piping System

6. Smoke Detectors

1.2 QUALIFICATIONS

A. The Contractor shall submit the name and qualifications of the test and balance technician within fifteen (15) days after award of the contract.

1.3 TEST AND BALANCE AGENCY

A. Test and balance agency shall be an independent agency, certified and licensed to perform test and balance services by the Associated Air Balance Council and with all qualified technicians under the direct supervision of an AABC certified Test and Balance Engineer, or by the National Environmental Balancing Bureau with all qualified technicians under the direct supervision of a NEBB certified Testing, Adjusting and Balancing Engineer.

1.4 RELATION TO OTHER WORK

A. Refer to the Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. No attempt shall be made to perform test and balance work until the system is complete and operable in all respects. All systems shall be operating during the test and balance procedure.

1.5 INDUSTRY STANDARDS

A. Associated Air Balance Council National Standards for Field Measurement and Instrumentation, Latest Edition, or:

B. National Environmental Balancing Bureau Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems, Latest Edition.

PART 2 - PRODUCTS

2.1 TESTING

A. Perform all Testing, Balancing, Adjusting, and Data Recording necessary to establish and confirm capacity, quality, and completed status of work.

B. Advise Engineer of all tests seven days prior to testing so that, at his option he may be present.

PART 3 - EXECUTION

3.1 PROCEDURE

A. When the mechanical work is in a state of readiness for test and balance work to proceed, the test and balance technician shall proceed with his work. If, upon thus proceeding, the test and balance contractor determines that there are other items of the work which have not been completed to an extent which will allow him to complete test and balance work, then he shall make a detailed written report of these items and shall send written notification to the Contractor of such incomplete work. The Contractor shall then send a copy of this report to the Engineer. The test and balance work shall not proceed until these items are corrected; such correction shall be subject to approval of the Engineer.

B. After all air distribution devices have been balanced to distribute calculated design indicated air quantities, and if temperatures in any area or any zone is not maintained with 2 degrees, plus or minus, of the zone area which does have the zone temperature control thermostat, then notify Engineer in writing of such conditions, and obtain Engineer's approval to rebalance devices to obtain air quantities other those indicated, so that air temperature in entire zone will be as even as possible, regardless of calculated design air quantities. After obtaining Engineer's written approval to rebalance, perform such necessary rebalancing.

C. All mechanical systems shall be balanced to optimum performance capabilities of the equipment and the design. This shall be done in accordance with the standards published by the Associated Air Balance Council or National Environmental Balancing Bureau unless otherwise indicated.

D. Report: Upon completion of all testing and balancing, and prior to requesting final inspection and acceptance of the project, submit three (3) complete copies of the Test and Balance Report to the Engineer for approval.

3.2 AIR DISTRIBUTION SYSTEM TESTING PROCEDURE

A. The Air Balance and Testing Agency shall perform the following tests, and balance the system in accordance with the following requirements:

1. Test and adjust blower rpm to design requirements.

2. Test and record motor full load amperes.

3. Make Pitot tube transverse of main supply and obtain design cfm at fans.

4. Test and record system static pressures, suction discharge.

5. Test and adjust system for design cfm recirculated air.

6. Test and adjust system for design cfm outside air.

7. Test and record entering air temperatures (db heating and cooling).

8. Test and record entering air temperatures (wb cooling).

9. Test and record leaving air temperatures (db heating and cooling).

10. Test and record leaving air temperatures (wb cooling).

11. Adjust all main supply and return air ducts to proper design cfm.

12. Adjust all zones to proper design cfm, supply and return.

13. Test and adjust each diffuser, grille, and register to within 10% of design requirements.

14. Identify each diffuser, grille, and register as to location and area.

15. Identify and list size, type, and manufacturer of diffusers, grilles, registers, and all testing equipment. Use manufacturer's rating on all equipment to make required calculations.

16. In readings and tests of diffusers, grilles, and registers, include required fpm velocity and test fpm velocity, and required cfm and test cfm after adjustments.

17. In cooperation with the control manufacturer's representative, set adjustments of automatically operated dampers to operate as specified, indicated, and/or noted.

18. Adjust all diffusers, grilles, and registers to minimize drafts in all areas.

B. As part of this contract, the Contractor shall make any changes in the pulleys, belts, and dampers, or add any dampers, as required for correct balance as recommended by the Air Balance and Testing Agency, at no additional cost to the Owner.

C. Provide differential pressure tests across each smoke detector and record same. Test shall be in accordance with the detector manufacturers recommendations.

3.3 WATER DISTRIBUTION SYSTEMS TESTING PROCEDURE

A. Preparation of System - Phase 1: The balance engineer or technicians must prepare the water systems for balancing in the following manner:

1. Open all valves to full position, including coil stop valves, close bypass valves, and return line balancing cocks.

2. Remove and clean all strainers.

3. Examine water in system to determine if it has been treated and is clean.

4. Check pump rotation.

5. Check expansion tanks to make sure they are not air bound and that the system is full of water.

6. Check all air vents at high points of water systems to make sure they are installed properly and are operating freely. Make certain all air is removed from circulating system.

7. Set all temperature controls so that all coils are calling for full cooling. This should close all automatic bypass valves at coil and chillers. To balance hot water coils, set system to call for full heating.

8. Check operation of automatic bypass valve.

9. Check and set operating temperature of boilers, heat exchangers, and chillers to design requirements.

10. Complete air balance must have been accomplished before water balance is begun.

B. Test and Balance Procedure - Phase 2:

1. Set chilled water, condenser water, and hot water pumps to proper gpm delivery.

2. Adjust flow of chilled water through chiller.

3. Adjust flow of hot water through boilers, heat exchangers, and condensers.

4. Check leaving water temperatures and return water temperatures, and pressure drop through chillers and boilers. Reset to correct design temperatures. Include heat exchangers and condensers.

5. Check water temperature at inlet side of cooling and heating coils. Note rise or drop of temperatures from source.

6. Balance each chilled water and hot water coil.

7. Upon completion of flow readings and coil adjustments, mark all settings and record all data.

C. Test and Balance Procedure - Phase 3:

1. After making adjustments to coils, recheck settings at pumps, chiller, and boilers. Readjust if required.

2. Install pressure gauges on each coil, then read pressure drop through coil at set flow rate on call for full cooling and full heating.

3. Follow the same procedure on chillers to adjust chiller bypass valves.

4. Check and record the following items at each cooling and heating element:

   a. Inlet water and air temperatures.

   b. Leaving water and air temperatures.

   c. Pressure drop of each coil.

   d. Pressure drop across bypass valve.

   e. Pump operating suction and discharge pressures and final t.d.h.

   f. All mechanical specifications of pumps.

   g. Rated and actual running amperage of pump motor.

End of Section

SECTION 23 07 00 THERMAL INSULATION

PART 1 - GENERAL

1.1 SCOPE

A. Provide labor and materials to insulate equipment, piping, ductwork and miscellaneous items in the piping and duct systems as indicated on the drawings and specified herein.

1.2 RELATION TO OTHER WORK

A. Refer to the Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. No insulation adhesives, materials or finishes shall be applied until the item to be insulated has been completely installed, tested and proved tight.

1.3 SUBMITTALS

A. Submittals shall contain complete descriptive and engineering data, including flame spread and smoke developed ratings (ASTM E84 test method), on all materials and adhesives.

B. Where finishes, covers, or jackets are specified, provide complete data on same.

C. Submittals shall contain specified information on: densities, conductivities, conductances, or resistances as required to establish conformance with the specified values or materials.

D. Where compliance with an industry, society, or association standard is specified or indicated, certification of such compliance shall be included in the submittal.

1.4 STORAGE OF MATERIALS

A. Insulation, adhesives, and finishes may be stored at the site provided that they are stored in such a manner as to protect them from damage. Use of the site shall comply with the General Conditions and such other provisions of the Contract Documents as may limit or restrict said use.

B. Do not store flammable materials within the building.

C. Do not store fiberglass insulation within the building until it has been "dried in". If no other dry space is available and this insulation must be installed or stored before the building is "dried in" and completely enclosed, provide polyethylene film cover for protection.

1.5 INDUSTRY STANDARDS

A. All materials and adhesives used on piping systems, and in or on ductwork, shall conform to the requirements of NFPA 90A as to flame spread and smoke developed ratings.

B. All products shall bear labels indicating their compliance with the requirements of NFPA 90A as to the flame spread and smoke developed ratings.

1.6 MANUFACTURER

A. Manufacturers are indicated in "Basis of Design" to establish the quality and performance standards of the desired material.

B. Other manufacturers whose products are equal in all respects to those specified may be submitted for approval.

PART 2 - MATERIALS

2.1 INSULATING MATERIALS

A. Preformed Cellular Glass Pipe Insulation:

1. Impermeable, non-combustible, inorganic preformed cellular glass rigid pipe insulation.

2. Thermal conductivity "k" factor at 75oF of 0.33 or less.

3. Water vapor permeability of 0.01 perm/inch or less.

4. Fire/smoke rating of 25/50 or less.

5. Suitable for piping temperatures from -400oF to 900 oF.

6. Basis of Design: Pittsburgh-Corning "Foamglas"

B. Cellular Glass Block Insulation:

1. Impermeable, non-combustible, inorganic preformed cellular glass rigid pipe insulation.

2. Thermal conductivity "k" factor at 70oF of 0.33 or less.

3. Water vapor permeability of 0.01 perm/inch or less.

4. Fire/smoke rating of 25/50 or less.

5. Suitable for piping temperatures from -400oF to 900oF.

6. Basis of Design: Pittsburgh-Corning "Foamglas"

C. Preformed Glass Fiber Pipe Insulation with All Purpose Self-Sealing Jacket:

1. Uniform construction of long glass fibers bonded in resin, with factory applied jacket.

2. Thermal conductivity "k" factor at 75oF of 0.25 or less.

3. Water vapor permeability of 0.02 perm/inch or less.

4. Fire/smoke rating of 25/50 or less.

5. Suitable for piping temperatures up to 500oF.

6. Basis of Design: John Manville "Micro-Lok" with AP-T Plus jacket.

D. Preformed Glass Fiber Pipe Insulation with Metal Jacket:

1. Uniform construction of long glass fibers bonded in resin.

2. Thermal conductivity "k" factor at 75oF of 0.25 or less.

3. Water vapor permeability of 0.02 perm/inch or less.

4. Fire/smoke rating of 25/50 or less.

5. Suitable for piping temperatures up to 500oF.

6. Suitable for use in sites exposed to weather or physical abuse.

7. Basis of Design: John Manville "Micro-Lok" with or without AP jacket, for field application of metal jacketing.

E. Flexible Blanket Fiberglass Duct Insulation:

1. Long glass fibers bonded in resin into a flexible blanket, with factory applied FSK vapor barrier facing.

2. Thermal conductivity "k" factor at 75oF of 0.25 or less for 1 lb/CF density.

3. Water vapor permeability of 0.02 perm/inch or less.

4. Composite fire/smoke rating of 25/50 or less.

5. Suitable for temperatures up to 250oF.

6. Facing of aluminum foil / fiberglass yarn mesh / fire resistant kraft paper.

7. Basis of Design: John Manville "Microlite", Type 100, with FSK facing.

F. Non-Flexible Fiberglass Duct Insulation:

1. Long glass fibers bonded in resin into a non-flexible sheet, with factory applied FSK type vapor barrier facing.

2. Thermal conductivity "k" factor at 75oF of 0.23 or less for 3 lb/cubic foot density.

3. Water vapor permeability of 0.02 perm/inch or less.

4. Composite fire/smoke rating of 25/50 or less.

5. Suitable for temperatures of –20 oF up to 150oF.

6. Type I AP (All Purpose) facing of white kraft paper bonded to aluminum foil, reinforced with fiberglass yarn mesh.

7. Basis of Design: John Manville "800 Series Spin-Glas", Three pound density, Type 814, with all purpose "AP" facing.

G. Elastomeric Pipe Insulation:

1. Flexible, closed, cell, elastomeric pipe and tube insulation.

2. Thermal conductivity "k" factor at 75oF of 0.27 or less.

3. Water vapor permeability of 0.10 perm inch or less.

4. Fire/smoke rating of 25/50 or less.

5. Suitable for temperatures from -30oF to 220oF.

6. Basis of Design: Armstrong "AP Armaflex" pipe insulation.

H. Elastomeric Sheet Insulation:

1. Flexible, closed cell, elastomeric sheet insulation.

2. Thermal conductivity "k" factor at 75oF of 0.27 or less.

3. Water vapor permeability of 0.10 perm inch or less.

4. Fire/smoke rating of 25/50 or less for 3/4" thickness.

5. Suitable for temperatures from -30oF to 220oF.

6. Basis of Design: Armstrong "Armaflex II" sheet insulation.

I. Removable Insulation Blankets:

1. Provide removable insulation blankets fabricated to fit the configuration of the item being insulated, i.e., pump, valve, etc. The blankets must fit with

no resulting gaps or compression of the insulation in order to maintain their insulating effectiveness. All materials shall be temperature resistant to 500oF minimum.

2. Insulating filler: Glass fiber, matted, 10 lbs/cu.ft. density, conforming to MIL-1-16411 Type 11, or Alumina Silica Refractory fiber matting.

3. Hot/Cold Face Enclosure Material: Alpha Style C911-3259 silicone impregnated glass fiber fabric, 17.5 oz./sq.yd. total weight, 24% of which is silicone.

4. Fasteners: Velcro one inch (1") wide straps permanently sewn to blanket with opposing securement flap sewn in the appropriate location.

5. Basis of Design: "The M.A.C. Group"

2.2 ADHESIVES, MASTICS, SEALANTS, AND COATINGS

A. Adhesives:

1. Fiberglass Insulation to Metal: Quick setting, non-flammable, fire resistive adhesive serviceable from -20oF to 180oF, fire/smoke rating of 25/50 or less.

   a. Basis of Design: Fosters 85-20.

2. Calcium Silicate Insulation Adhesive: Sodium silicate based adhesive designed to adhere calcium silicate to itself and non-porous surfaces.

   a. Basis of Design: Fosters 81-93.

3. Elastomeric Insulation Adhesive: Note flammability and safety precautions necessary with this adhesive. Do not store this adhesive inside the building. Shall have dried film composite fire/smoke rating of 25/50 or less.

   a. Basis of Design: Armstrong 520 Adhesive.

B. Mastics:

1. For elastomeric insulation: Breathing type mastic coating, tough, durable, fire-resistive, for use with 10 x 10 glass fabric mesh.

   a. Basis of Design: Childers AK-CRYL CP-9.

2. For Insulated Ductwork: General purpose asbestos free high solids water-based mastic designed for trowel/glove or brush/spray application. Serviceable from -20oF to 200oF; Fire/smoke rating of 25/50 or less; maximum permeability of 3.0 perm inch; non-flammable and non-toxic; Ul and USDA compliant.

   a. Basis of Design: Foster “SEALFAS G-P-M” 35-00 / 45-00.

C. Sealants:

1. Cellular Glass Vapor Barrier Sealant: Butyl based non-hardening vapor barrier sealant, serviceable from -70oF to 180oF. specifically designed for use with cellular glass. Water and weather resistant, water permeability of 0.01 perm inch or less.

   a. Basis of Design: Pittseal 444N.

2. Vapor Barrier Sealant: Fast setting, water resistant adhesive-sealant designed for bonding two impermeable surfaces. Non-flammable in wet state. Serviceable from -20oF to 200oF. Fire/smoke rating of 25/50 or less.

   a. Basis of Design: Foster's 85-75 Contact Bond Cement.

3. Polystyrene Sealant: Butyl rubber non-hardening one-component vapor and moisture resistant sealant designed for use with PermaTherm Polystyrene pipe insulation.

   a. Basis of Design: PermaTherm #907 Butyl Rubber Sealant.

D. Coatings and Fabrics:

1. Cellular Glass Bore Coating: Factory applied vinyl base anti-abrasive compound specifically designed for use with cellular glass insulation.

   a. Basis of Design:

2. Cellular Glass Coating and Joint Sealant: Acrylic latex water base, highly flexible, fire resistive coating, serviceable from -30oF to 180oF., permeability of 0.4 perm inch, Fire/Smoke rating of 25/50 or less.

   a. Basis of Design: Pittcote 404.

3. Cellular Glass Coating: Asphalt based coating, serviceable from -40oF to 200oF. with permeability of 0.4 perm inch.

   a. Basis of Design: Pittsburgh Corning "Pittcote 300" (for outdoor use only).

4. Fabric: Polyester mesh fabric. 0.125 inch mesh opening, high tensile strength.

   a. Basis of Design: Pittsburgh Corning Fabric 79.

5. Vapor Barrier Tape for use with PermaTherm Polystyrene Insulated pipes: Three-ply laminate of 1 mil aluminum foil with 0.5 mil polyester film on both sides coated with a cold weather acrylic pressure-sensitive adhesive system. Minimum width of two inches (2”).

   a. Basis of Design: PermaTherm MLS14 Cryogenic Vapor Barrier Tape.

2.3 FINISHES

A. Elastomeric Weather-Resistant Insulation Finish: Note flammability and safety precautions necessary with this finish. Do not store this finish inside of the building. Shall have dried film composite fire/smoke rating of 25/50 or less.

   1. Basis of Design: Armstrong Armaflex finish.

B. Thermal Insulation Coating: Tough, washable, abrasive resistant, non-flammable coating for thermal insulation not requiring an external vapor barrier. Serviceability from 0oF to 180oF. Fire-smoke rating of 25/50 or less.

   1. Basis of Design: Foster's 30-36 Coating.

C. Pipe Jacketing: Aluminum jacketing, 0.016 inches thick, type 3003 alloy, H-14 temper, circumferentially corrugated, with a continuously laminated moisture barrier of one mil polyethylene film and a protective layer of 40 lb. virgin paper.

   1. Basis of Design: Childers Products Co. "Corrolon".

D. Pipe Fitting Covers: Aluminum fitting covers, 0.20 inches minimum thickness, type 3003 alloy, H-14 temper prefabricated fitting covers with baked epoxy moisture barrier for pipe sizes through 24". Field fabricate fitting covers for pipe sizes larger than 24" using 0.020 inches thick aluminum roll jacketing with laminated polyethylene/kraft moisture barrier.

   1. Basis of Design: Childers Products "Ell-Jacs", "Gore Ell-Jacs", "Tee-Jacks", "End-Caps", "Beveled Collars", "Valve Fitting Covers", and "Flange Jacs".

E. Flexible Insulation Jacket for Below Grade Use: Prefabricated laminate containing a 10x10 asphalt impregnated glass fabric and a one mill thick aluminum foil sandwiched between three layers of a bituminous mastic. The exposed (outer) surface shall be coated with a plastic film and the inner surface with a release paper. Total thickness shall be not less than 125 mils.

   1. Basis of Design: Pittsburgh Corning "PITTWRAP" (heat seal).

F. Flexible, non-metallic Insulation Jacket for Below Grade Use on Chilled Water Piping: Self-sealing non-metallic sheet material not requiring torch or heater, 50 mil thickness, composed of polymer-modified bituminous compound reinforced with glass fabric and a one mil thick aluminum top surface film, used for protection of above ground cellular glass insulation systems.

1. Basis of Design: Pittsburgh Corning “PITTWRAP CW Plus”.

2.4 MISCELLANEOUS MATERIALS

A. Tape:

1. No tape for ductwork is approved for this project.

2. Polystyrene Pipe Insulation Strapping Tape: Fiber reinforced ¾” wide tape designed to secure the insulation in place prior to the application of the vapor barrier or finish. Basis of Design: Compac #150 Filament Strapping Tape.

B. Wire: 16 gauge dead soft copper or 16 gauge stainless steel.

C. Screws: Aluminum pan head type "A", slotted, #8 by 1/2 inch.

PART 3 - INSTALLATION

3.1 GENERAL

A. The insulation of a particular item shall be considered as an insulation system. All components of this system, including adhesives mastics, sealants, coatings, and finishes, shall be as recommended by the insulation manufacturer as compatible for use with his insulation. The installation of the insulation system shall be in accordance with the insulation manufacturer's recommendations.

3.2 CHILLED WATER PIPING – CELLULAR GLASS

A. Insulate with prefabricated cellular glass pipe insulation. Butter all joints with joint sealant and secure each section with not less than two (2) copper wires or stranded tape. Miter and fit all pipe fittings, valves and equipment connections.

B. All pipes, valves and accessories shall be insulated as above in order to prevent sweating. Where access is required, the jacketing and insulation shall be banded in place and removable.

C. Small items such as valves, thermometer stems, etc., shall be insulated with elastomeric tube insulation. Where exposed to weather, insulation and jacket shall be installed to shed water, and insulation thickness shall be increased 1/2".

D. Chilled Water Piping Insulation Thickness (for Piping Outdoors, Increase Thickness 1/2 Inch):

Pipe Size	Insulation Thickness
1 inch and smaller	1-1/2"
1-1/4 inch – 2 inch	2"
2-1/2 inch and larger	3"

E. Insulation System:

1. Clean piping to be insulated of all dirt, welding slag, and other foreign matter.

2. Apply insulation to pipe and fittings with all joints tightly fitted. Secure each piece of insulation with two wire ties.

3. Seal all joints with cellular glass vapor barrier sealant.

4. Finish with white kraft all service jacket.

5. Seal all joints and punctures with glass fab and mastic.

6. Provide pipe jacketing and pipe fitting covers on all piping within six feet of floor or platform, and other locations subject to physical abuse.

3.3 REFRIGERANT PIPING

A. Insulate all refrigerant piping with pre-formed elastomeric pipe insulation of the thickness indicated. Insulation located in air plenums shall meet NFPA-90A requirements.

B. Piping Located Indoors in Conditioned Space:

1. Liquid Lines: No insulation required.

2. Suction Lines: Insulate with 3/4" thick insulation and seal joints with adhesive.

3. Hot gas Lines: Insulate with 3/4" thick insulation and seal joints with adhesive.

4. Finish: Provide finish on all exposed insulation.

C. Piping Located Outdoors or in Ventilated Areas:

1. Liquid Lines: No insulation required.

2. Suction Lines: Insulate with 3/4" thick insulation, seal joints with adhesive. Cover with aluminum jacket.

a. Aluminum Jacket: Cover insulated piping with aluminum jacket and secure to piping with 1/2" aluminum bands. Cover fittings with manufactured fitting covers and secure with 1/2" bands. All jacketing shall shed water.

b. Glass fabric and Mastic: Where soft copper piping has been used, provide glass fabric and mastic on sweeping bends. The glass fabric and mastic shall be applied first and shall extend 2" under the aluminum jacket. Provide aluminum jacket on all straight pipe.

D. Piping Located in Conduit System:

1. Liquid Lines: Insulate with 1/2" thick insulation and seal joints with adhesive.

2. Suction Lines: Insulate with 3/4" thick insulation and seal joints with adhesive.

3. Hot gas Lines: Insulate with 3/4" thick insulation and seal joints with adhesive.

4. Finish: None required within the conduit.

3.4 CONDENSATE DRAIN PIPING

A. Insulate all condensate drain piping with 1/2 inch elastomeric pipe insulation. Seal all joints, seams and punctures with adhesive and finish with elastomeric insulation finish.

3.5 DUCTWORK

A. Interior Concealed: Insulate all supply, ductwork that is not internally insulated, with flexible blanket duct insulation 2" thick. Insulate all return air and outside air ductwork with flexible blanket duct insulation 1 1/2" thick. Overlap internal insulation a minimum of one foot and vapor seal raw end as specified herein for joints. Where duct width exceeds twenty four inches (24") the insulation shall be additionally secured to the bottom of the duct using mechanical fasteners spaced one foot (1') on center. Insulation shall be applied with edges tightly butted and all joints and breaks in the vapor barrier sealed using glass fabric and vapor barrier sealant. Insulation shall be applied in conformance with the manufacturer's recommendations, and in compliance with the Florida Energy Code.

B. Interior, Exposed: Insulate all supply, return, and outside air ductwork that is not internally insulated with non-flexible fiberglass sheet insulation 1-1/2" thick. Overlap internal insulation a minimum of one foot and vapor seal raw end as specified herein for joints. Adhere duct insulation using a full coverage coat of

fiberglass insulation adhesive applied in accordance with the manufacturer's recommendations. Insulation shall be applied with edges tightly butted and all joints and breaks in the vapor barrier sealed using glass fabric and vapor barrier sealant. Insulation shall be applied in conformance with the manufacturer's recommendations, and in compliance with the Florida Energy Code. Heating only supply and return ducts exposed in the heated spaces need not be insulated.

C. Exterior Exposed to Weather: In addition to any internal fiberglass insulation, insulate as follows: Apply 3" thick cellular glass block insulation to exterior surfaces in accordance with insulation manufacturer's recommendations. Taper thickness of insulation applied to top horizontal surfaces from 3” thickness at edges to 3-1/2" thickness at the center or at one edge, to provide a crowned surface so that water will drain off. Provide a glass fabric and mastic finish on the insulation surface. Insulation shall be applied in conformance with the manufacturer's recommendations, and in compliance with the Florida Energy Code. Provide a metal cover over the insulation on the top and the sides. Bottom of side shall extend down past insulation with a hemmed-under drip edge to keep water clear of the insulation. Metal shall be galvanized steel with paint-grip finish, stainless steel, or aluminum. Metal thickness and reinforcement shall equal or exceed the SMACNA guidelines for the covered duct size at six inches (6”) wg positive static pressure.

3.6 CEILING DIFFUSERS

A. Insulate the backs of all ceiling diffusers and other air outlet devices installed in other than return air plenums as specified for ductwork, interior concealed, in the preceding paragraphs.

3.7 INSULATION FIT

A. Where insulation is applied to pipe or equipment, it shall be installed with all joints fitted to eliminate voids. Voids shall not be filled with joint sealant, but shall be eliminated by refitting or replacing insulation.

3.8 PROTECTION OF WORK

A. Protect all finishes and vapor barrier seals from damage prior to final acceptance and make repairs to damaged finishes or vapor barriers immediately.

B. Protect adjacent surfaces from damage or spillage during installation and cleanup any spillage or spatters of adhesives or finishes immediately.

End of Section

SECTION 23 09 00 BUILDING AUTOMATION SYSTEM

PART 1 - GENERAL

1.1 SCOPE

A. Building Automation System (BAS) Contractor shall provide:

1. A building automation system (BAS), UL listed, incorporating direct digital control (DDC) for equipment monitoring and control.

2. Complete temperature control system to be DDC as specified herein.

3. All wiring, conduit, panels, for all DDC temperature controls.

4. All final electrical connections to each stand-alone Application Specific Controller.

5. BAS Contractor shall be responsible for all electrical work associated with the BAS control system and as called for on the Drawings.

a. Perform all wiring in accordance with all local and national codes.

b. Install all line voltage wiring, concealed or exposed, in accordance with Division 26.

c. Electrical Contractor shall provide 120 volt, 20 amp circuits and circuit breakers from normal and/or emergency power panel for direct digital control systems.

d. Surge transient protection shall be incorporated in design of system to protect electrical components in all DDC Controllers, Application Specific Controllers and operator's workstations.

e. Concealed, accessible low-volt Class II NEC wiring may be installed utilizing UL plenum rated cable not in conduit.

B. General Product Description:

1. The building automation system (BAS) perform functions of equipment supervision and control.

2. The building automation system shall consist of the following:

a. Stand-alone Application Specific Controllers (ASCs)

b. Operator's terminals

c. DDC Controllers (as required to meet specification requirements)

3. The system shall be modular in nature and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, DDC Controllers, Application Specific Controllers and operator devices.

4. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution. Each DDC Controller shall operate independently by performing its own specified control, alarm management, operator I/O and data collection. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

5. DDC Controllers shall be able to access any data from, or send control commands and alarm reports directly to, any other DDC Controller or combination of controllers on the network without dependence upon a central processing device. DDC Controllers shall also be able to send alarm reports to multiple operator workstations without dependence upon a central processing device.

C. Work furnished, but installed by others:

1. BAS Contractor to furnish:

a. To Mechanical Contractor for field installation:

1. Control valves and Dampers

1.2 CODE REQUIREMENTS

A. Perform work in accordance with applicable statutes, ordinances, codes and regulations of governmental authorities having jurisdiction. Applicable codes are as follows;

1. American National Standards Institute (ANSI)

2. National Electric Code (NEC)

3. National Electrical Manufacturers Associations (NEMA)

4. Underwriters Laboratories (UL)

5. National Fire Protection Agency (NFPA)

6. Occupational Safety and Health Association (OSHA)

7. Florida Building Code

8. Florida Department of Commerce Safety Regulations

1.3 QUALITY ASSURANCE

A. Materials and equipment shall be the catalogued products of manufacturers regularly engaged in production and installation of automatic temperature control systems and shall be manufacturer's latest standard design that complies with the specification requirements.

B. Install system using competent workmen who are fully trained in the installation of temperature control equipment.

C. Single source responsibility of supplier shall be the complete installation and proper operation of the BAS and control system and shall include debugging and proper calibration of each component in the entire system.

D. Supplier shall have an in-place support facility within 100 miles of the site with technical staff, spare parts inventory and all necessary test and diagnostic equipment.

E. All electronic equipment shall conform to the requirements of FCC Regulation, Part 15, Section 15, Governing Radio Frequency Electromagnetic Interference and be so labeled.

F. BAS shall comply with UL 916 PAZX and 864 UDTZ and be so listed at the time of bid.

G. Design and build all system components to be fault-tolerant.

1. Satisfactory operation without damage at 110% and 85% of rated voltage and at plus 3 Hertz variation in line frequency.

2. Static, transient and short-circuit protection on all inputs and outputs.

3. Protect communication lines against incorrect wiring, static transients and induced magnetic interference.

4. Network-connected devices to be A.C. coupled or equivalent so that any single device failure will not disrupt or halt network communication.

5. All real time clocks and data file RAM to be battery-backed for a minimum 72 hours and include local and system low battery indication.

1.4 SUBMITTALS

A. Submit 5 complete sets of documentation.

1. Manufacturer's Product Data:

a. All equipment components

2. Shop Drawings:

a. System wiring diagrams with sequence of operation for each system as specified.

b. Submit manufacturer's product information on all hardware items along with descriptive literature for all software programs to show compliance with specifications.

c. System configuration diagram showing all panel types and locations as well as communications network and workstations.

B. Where installation procedures, or any part thereof, are required to be in accord with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Architect/Engineer prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Andover

2.2 NETWORKING COMMUNICATIONS

A. The design of the BAS shall network operator workstations and stand-alone DDC Controllers. The network architecture shall consist of two levels, a high performance peer-to-peer network and DDC Controller specific local area networks.

B. Access to system data shall not be restricted by the hardware configuration of the building automation system. The hardware configuration of the BAS network shall be totally transparent to the user when accessing data or developing control programs.

C. Peer-to-Peer Network Level:

1. Operator workstations and DDC Controllers shall directly reside on a network such that communications may be executed directly between DDC Controllers, directly between workstations and between DDC Controllers and workstations on a peer-to-peer basis.

2. Systems that operate via polled response or other types of protocols that rely on a central processor, file server, or similar device to manage panel-to-panel communications may be considered only if a similar device is provided as a standby. Upon a failure or malfunction of the primary central processor, the standby shall automatically, without any operator intervention, assume all BAS network management activities.

3. All operator devices either network resident or connected via dial-up modems shall have the ability to access all point status and application report data or execute control functions for any and all other devices via the peer-to-peer network. Access to data shall be based upon logical identification of building equipment. No hardware or software limits shall be imposed on the number of devices with global access to the network data.

4. Network design shall include the following provisions:

   a. Provide high-speed data transfer rates for alarm reporting, quick report generation from multiple controllers and upload/download efficiency between network devices. System performance shall insure that an alarm occurring at any DDC Controller is displayed at workstations and/or alarm printers within 5 seconds.

   b. Support of any combination of DDC Controllers and operator workstations directly connected to the peer-to-peer network. A minimum of 32 devices shall be supported on a single network.

   c. Message and alarm buffering to prevent information from being lost.

5. Error detection, correction and retransmission to guarantee data integrity.

6. Synchronization of real-time clocks, to include automatic daylight savings time updating between all DDC Controllers shall be provided.

D. DDC Controller Local Area Network (LAN):

1. This level communication shall support a family of application specific controllers and shall communicate bi-directionally with the peer-to-peer network through DDC Controllers for transmission of global data.

2. Application specific controllers shall be arranged on the LANs in a functional relationship manner with DDC Controllers. For example, a VAV terminal unit controller shall be on a LAN from the DDC Controller that is controlling its corresponding AHU.

3. A maximum of 32 application specific controllers may be configured on individual DDC Controller LANs to insure adequate global data and alarm response times.

E. Telecommunication Capability:

1. Internet communications shall be provided to allow DDC Controllers to communicate with remote operator stations and/or remote terminals on an intermittent basis via telephone lines.

2. Internet DDC Controllers shall automatically report to workstations alarms or other significant events.

2.3 DDC CONTROLLER

A. Stand-alone Controllers shall be microprocessor-based with a minimum word size of 16 bits. They shall also be multi-tasking, multi-user, real-time digital control processors consisting of modular hardware with plug-in enclosed processors, communication controllers, power supplies and input/output point modules. Controller size shall be sufficient to fully meet the requirements of this specification and the attached point list.

B. Each DDC Controller shall have sufficient memory, a minimum of 1 megabyte, to support its own operating system and databases, including:

1. Control processes
2. Energy management applications
3. Alarm management applications including custom alarm messages for each level alarm for each point in the system.
4. Historical/trend data for points specified
5. Maintenance support applications
6. Custom processes
7. Operator I/O
8. Dial-up communications
9. Manual override monitoring

C. Each DDC Controller shall support:

1. Monitoring of the following types of inputs, without the addition of equipment outside the DDC Controller cabinet:

a. Analog inputs

1. 4-20 mA
2. 0-10 Vdc
3. Thermistors
4. 1000 ohm RTDs

b. Digital inputs

1. Dry contact closure
2. Pulse Accumulator

3. Voltage Sensing

2. Direct control of pneumatic and electronic actuators and control devices. Each DDC Controller shall be capable of providing the following control outputs without the addition of equipment outside the DDC Controller cabinet:

a. Digital outputs (contact closure)

1. Contact closure (motor starters, sizes 1-4)

b. Analog outputs

1. 0-20 psi

2. 4-20 mA

3. 0-10 Vdc

D. Each DDC Controller shall have a minimum of 10 per cent spare capacity for future point connection. The type of spares shall be in the same proportion as the implemented I/O functions of the panel, but in no case shall there be less than two spares of each implemented I/O type. Provide all processors, power supplies and communication controllers complete so that the implementation of a point only requires the addition of the appropriate point input/output termination module and wiring.

1. Provide sufficient internal memory for the specified control sequences and have at least 25% of the memory available for future use.

E. DDC Controllers shall provide at least two RS-232C serial data communication ports for operation of operator I/O devices such as industry standard printers, operator terminals, modems and portable laptop operator's terminals. DDC Controllers shall allow temporary use of portable devices without interrupting the normal operation of permanently connected modems, printers or terminals.

F. As indicated in the point I/O schedule, the operator shall have the ability to manually override automatic or centrally executed commands at the DDC Controller via local, point discrete, on-board hand/off/auto operator override switches for digital control type points and gradual switches for analog control type points. These override switches shall be operable whether the panel processor is operational or not.

1. Switches shall be mounted either within the DDC Controllers key-accessed enclosure, or externally mounted with each switch keyed to prevent unauthorized overrides.

2. DDC Controllers shall monitor the status of all overrides and inform the operator that automatic control has been inhibited. DDC Controllers shall also collect override activity information for reports.

G. DDC Controllers shall provide local LED status indication for each digital input and output for constant, up-to-date verification of all point conditions without the need for an operator I/O device. Graduated intensity LEDs or analog indication of value shall also be provided for each analog output. Status indication shall be visible without opening the panel door.

H. Each DDC Controller shall continuously perform self-diagnostics, communication diagnosis and diagnosis of all panel components. The DDC Controller shall provide both local and remote annunciation of any detected component failures, low battery conditions or repeated failure to establish communication.

I. Isolation shall be provided at all peer-to-peer network terminations, as well as all field point terminations to suppress induced voltage transients consistent with IEEE Standards 587-1980.

J. In the event of the loss of normal power, there shall be an orderly shutdown of all DDC Controllers to prevent the loss of database or operating system software. Non-volatile memory shall be incorporated for all critical controller configuration data and battery backup shall be provided to support the real-time clock and all volatile memory for a minimum of 72 hours.

1. Upon restoration of normal power, the DDC Controller shall automatically resume full operation without manual intervention.

2. Should DDC Controller memory be lost for any reason, the user shall have the capability of reloading the DDC Controller via the local RS-232C port, via telephone line dial-in or from a future network workstation PC.

2.4 DDC CONTROLLER RESIDENT SOFTWARE FEATURES

A. General:

1. All necessary software to form a complete operating system as described in this specification shall be provided.

2. The software programs specified in this Section shall be provided as an integral part of DDC Controllers and shall not be dependent upon any higher level computer for execution.

B. Control Software Description:

1. The DDC Controllers shall have the ability to perform the following pre-tested control algorithms:

a. Two-position control

b. Proportional control

c. Proportional plus integral control

d. Proportional, integral, plus derivative control

e. Control loop tuning

2. Control software shall include a provision for limiting the number of times each piece of equipment may be cycled within any one-hour period.

3. The system shall provide protection against excessive demand situations during start-up periods by automatically introducing time delays between successive start commands to heavy electrical loads.

4. Upon the resumption of normal power, each DDC Controller shall analyze the status of all controlled equipment, compare it with normal occupancy scheduling and turn equipment on or off as necessary to resume normal operations.

C. DDC Controllers shall have the ability to perform any or all the following energy management routines:

1. Time-of-day scheduling

2. Calendar-based scheduling

3. Holiday scheduling

4. Temporary schedule overrides

5. Start-Stop Time Optimization

6. Automatic Daylight Savings Time Switchover

7. Night setback control

8. Enthalpy switchover (economizer)

9. Peak demand limiting

10. Temperature-compensated duty cycling

11. Fan speed/CFM control

12. Heating/cooling interlock

13. Cold deck reset

14. Hot deck reset

15. Hot water reset

16. Chilled water reset

17. Condenser water reset

18. Chiller sequencing

D. All programs shall be executed automatically without the need for operator intervention and shall be flexible enough to allow user customization. Programs shall be applied to building equipment as described in the Sequence of Operations.

E. DDC Controllers shall be able to execute custom, job-specific processes defined by the user, to automatically perform calculations and special control routines.

1. It shall be possible to use any of the following in a custom process:

a. Any system measured point data or status

b. Any calculated data

c. Any results from other processes

d. User-defined constants

e. Arithmetic functions (+, -, *, /,square root, exp, etc.)

f. Boolean logic operators (and/or, exclusive or, etc.)

g. On-delay/off-delay/one-shot timers

2. Custom processes may be triggered based on any combination of the following:

a. Time interval

b. Time-of-day

c. Date

d. Other processes

e. Time programming

f. Events (e.g., point alarms)

3. A single process shall be able to incorporate measured or calculated data from any and all other DDC Controllers on the network. In addition, a single process shall be able to issue commands to points in any and all other DDC Controllers on the network.

4. Processes shall be able to generate operator messages and advisories to operator I/O devices. A process shall be able to directly send a message to a specified device or cause the execution of a dial-up connection to a remote device such as a printer or pager.

5. The custom control programming feature shall be documented via English language descriptors.

F. Alarm management shall be provided to monitor and direct alarm information to operator devices. Each DDC Controller shall perform distributed, independent alarm analysis and filtering to minimize operator interruptions due to non-critical alarms, minimize network traffic and prevent alarms from being lost. At no time shall the DDC Controllers ability to report alarms be affected by either operator or activity at a future PC workstation, local I/O device or communications with other panels on the network.

1. All alarm or point change reports shall include the point's English language description and the time and date of occurrence.

2. The user shall be able to define the specific system reaction for each point. Alarms shall be prioritized to minimize nuisance reporting and to speed operator response to critical alarms. A minimum of six priority levels shall be provided for each point. Point priority levels shall be combined with user definable destination categories (PC, printer, DDC Controller, etc.) to provide full flexibility in defining the handling of system alarms. Each DDC Controller shall automatically inhibit the reporting of selected alarms during system shutdown and start-up. Users shall have the ability to manually inhibit alarm reporting for each point.

3. Alarm reports and messages will be directed to a user-defined list of operator devices or PCs.

4. In addition to the point's descriptor and the time and date, the user shall be able to print, display or store a 200 character alarm message to more fully describe the alarm condition or direct operator response.

   a. Each DDC Controller shall be capable of storing a library of at least 50 alarm messages. Each message may be assignable to any number of points in the Controller.

5. In dial-up applications, operator-selected alarms shall initiate a call to a remote operator device.

G. A variety of historical data collection utilities shall be provided to manually or automatically sample, store and display system data for points as specified in the I/O summary.

1. DDC Controllers shall store point history data for selected analog and digital inputs and outputs:

   a. Any point, physical or calculated may be designated for trending. Any point, regardless of physical location in the network, may be collected and stored in each DDC Controllers point group. Two methods of collection shall be allowed: either by a pre-defined time interval or upon a pre-defined change of value. Sample intervals of 1 minute to 7 days shall be provided. Each DDC Controller shall have a dedicated RAM-based buffer for trend data and shall be capable of storing a minimum of 10,000 data samples.

2. Trend data shall be stored at the DDC Controllers and uploaded to the workstation when retrieval is desired. Uploads shall occur based upon either user-defined interval, manual command or when the trend buffers are full. All trend data shall be available for use in 3rd party personal computer applications.

3. DDC Controllers shall also provide high resolution sampling capability for verification of control loop performance. Operator-initiated automatic and manual loop tuning algorithms shall be provided for operator-selected PID control loops as identified in the point I/O summary. Provide capability to view or print trend and tuning reports.

   a. In automatic mode, the controller shall perform a step response test with a minimum one-second resolution, evaluate the trend data, calculate the new PID gains and input these values into the selected LOOP statement.

   b. For troubleshooting in manual mode, the operator shall be able to select variables to override default values. Calculated PID gains shall then be reviewed before they are inserted into the selected LOOP statement.

   c. Loop tuning shall be capable of being initiated either locally at the DDC Controller, from a network workstation or remotely using dial-in modems. For all loop tuning functions, access shall be limited to authorized personnel through password protection.

H. DDC Controllers shall automatically accumulate and store run-time hours for digital input and output points as specified in the point I/O summary.

   1. The totalization routine shall have a sampling resolution of one minute or less.

   2. The user shall have the ability to define a warning limit for run-time totalization. Unique, user-specified messages shall be generated when the limit is reached.

I. DDC Controllers shall automatically sample, calculate and store consumption totals on a daily, weekly or monthly basis for user-selected analog and digital pulse input type points as specified in the point I/O summary.

   1. Totalization shall provide calculation and storage of accumulations of up to 99,999.9 units (e.g., KWH, gallons, BTU, tons, etc.).

   2. The totalization routine shall have a sampling resolution of one minute or less.

   3. The user shall have the ability to define a warning limit. Unique, user-specified messages shall be generated when the limit is reached.

J. DDC Controllers shall have the ability to count events such as the number of times a pump or fan system is cycled on and off. Event totalization shall be

performed on a daily, weekly or monthly basis for points as specified in the point I/O summary.

1. The event totalization feature shall be able to store the records associated with a minimum of 9,999.9 events before reset.

2. The user shall have the ability to define a warning limit. Unique, user-specified messages shall be generated when the limit is reached.

2.5 APPLICATION SPECIFIC CONTROLLERS (ASC)

A. Each DDC Controller shall be able to extend its performance and capacity through the use of remote application specific controllers (ASCs).

B. Each ASC shall operate as a stand-alone controller capable of performing its specified control responsibilities independently of other controllers in the network. Each ASC shall be a microprocessor-based, multi-tasking, real-time digital control processor. Provide the following types of ASCs as a minimum:

1. Central System Controllers

2. Terminal Equipment Controllers

C. Central System Controllers:

1. Provide for control of central HVAC systems and equipment including, but not limited to, the following:

a. Rooftop units

b. Packaged air handling units

c. Built-up air handling systems

d. Chilled and condenser water systems

e. Steam and hot water systems

2. Controllers shall include all point inputs and outputs necessary to perform the specified control sequences. Provide a hand/off/automatic switch for each digital output for manual override capability. Switches shall be mounted either within the controller's key-accessed enclosure, or externally mounted with each switch keyed to prevent unauthorized overrides. In addition, each switch position shall be supervised in order to inform the system that automatic control has been overridden. As a minimum, 50% of the point inputs and outputs shall be of the Universal type, allowing for additional system flexibility. In lieu of Universal inputs and outputs, provide a minimum of 50% spare points of each type via additional point termination boards or controllers.

3. Each controller shall support its own real-time operating system. Provide a time clock with battery backup to allow for stand-alone operation in the

event communication with its DDC Controller is lost and to insure protection during power outages.

4. Provide each central system controller with sufficient memory to accommodate point databases, operating programs, local alarming and local trending. All databases and programs shall be stored in non-volatile EEPROM or a minimum of 72-hour battery backup shall be provided. All programs shall be field-customized to meet the user's exact control strategy requirements. Central System controllers utilizing pre-packaged or canned programs shall not be acceptable. As an alternative, provide DDC Controllers for all central equipment in order to meet custom control strategy requirements.

5. Programming of central system controllers shall utilize the same language and code as used by DDC Controllers to maximize system flexibility and ease of use. Should the system controller utilize a different control language, provide an DDC Controller to meet the specified functionality.

6. Local alarming and trending capabilities shall be provided for convenient troubleshooting and system diagnostics. Alarm limits and trend data information shall be user-definable for any point.

7. Each controller shall have connection provisions for a portable operator's terminal. This tool shall allow the user to display, generate or modify all point databases and operating programs. All new values and programs may then be restored to EEPROM via the programming tool.

D. Terminal Equipment Controllers:

1. Provide for control of each piece of equipment , including, but not limited to, the following:

   a. Variable Air Volume (VAV) boxes

   b. Fan Powered VAV boxes

   c. Unit Conditioner Controller

2. Controllers shall include all point inputs and outputs necessary to perform the specified control sequences. As a minimum, 50% of the point outputs (except for unit ventilator controllers) shall be of the Universal type; that is, the outputs may be utilized either as modulating or two-state, allowing for additional system flexibility. In lieu of Universal outputs, provide a minimum of 50% spare outputs of each type via additional point termination boards or controllers. Analog outputs shall be industry standard signals such as 24V floating control, allowing for interface to a variety of modulating actuators. Terminal equipment controllers utilizing proprietary control signals and actuators shall not be acceptable. As an alternative, provide DDC Controllers or other ASCs with industry standard outputs for control of all terminal equipment.

3. Each controller performing space temperature control shall be provided with a matching room temperature sensor. The sensor may be either RTD or thermistor type providing the following minimum performance requirements are met:

- **Accuracy:**	**± 1_F (±0.6_C)**
- **Operating Range:**	**35_ to 115_F (2_ to 46_)**
- **Set Point Adjustment Range:**	**55_ to 95_F (2_ to 30_C)**
- **Set Point Modes:**	**Independent Heating, Cooling, Night Setback-Heating, Night Setback-Cooling**
- **Calibration Adjustments:**	**None required**
- **Installation:**	**Up to 100 ft. from Controller**

a. Each room temperature sensor shall include a terminal jack integral to the sensor assembly. The terminal jack shall be used to connect a portable operator's terminal to control and monitor all hardware and software points associated with the controller. In lieu of an internal jack, provide a separate terminal jack mounted on a stainless steel wall plate adjacent to the sensor to facilitate direct access to the controller via the terminal.

b. Each room sensor shall also include the following auxiliary devices:

- **Setpoint Adjustment Dial**
- **Override Switch**

c. The setpoint adjustment dial shall allow for modification of the temperature by the occupant. Setpoint adjustment may be locked out, overridden or limited as to time or temperature through software by an authorized operator at the central workstation, DDC Controller, or via the portable operator's terminal. In lieu of an integral adjustment dial, provide a separate dial mounted on a stainless steel wall plate adjacent to the sensor to perform the specified functionality.

d. An override switch shall initiate override of the night setback mode to normal (day) operation when activated by the occupant. The override function may be locked out, overridden or limited as to

the time through software by an authorized operator at the central workstation, DDC Controller or via the portable operator's terminal. In lieu of an integral switch, provide a separate momentary contact switch mounted on a stainless steel wall plate adjacent to the sensor to perform the specified functionality.

4. Each controller shall perform its primary control function independent of other DDC Controller LAN communication, or if LAN communication is interrupted. Reversion to a fail-safe mode of operation during LAN interruption is not acceptable. The controller shall receive its real-time data from the DDC Controller time clock to insure LAN continuity. Each controller shall include algorithms incorporating proportional, integral and derivative (PID) gains for all applications. All PID gains and biases shall be field-adjustable by the user via terminals as specified herein. This functionality shall allow for tighter control of space conditions and shall facilitate optimal occupant comfort and energy savings. Controllers that incorporate proportional and integral (PI) control algorithms only shall not be acceptable.

5. Provide each terminal equipment controller with sufficient memory to accommodate point databases, operating programs, local alarming and local trending. All databases and programs shall be stored in non-volatile EEPROM, EPROM and PROM, or minimum of 72-hour battery backup shall be provided. The controllers shall be able to return to full normal operation without user intervention after a power failure of unlimited duration. Provide uninterruptible power supplies (UPSs) of sufficient capacities for all terminal controllers that do not meet this protection requirement. Operating programs shall be field-selectable for specific applications. In addition, specific applications may be modified to meet the user's exact control strategy requirements, allowing for additional system flexibility. Controllers that require factory changes of all applications are not acceptable.

6. Variable Air Volume (VAV) Box Controllers: Shall support the following types of pressure independent terminal boxes as a minimum:

   - **VAV cooling only**
   - **VAV with hot water reheat**
   - **VAV with electric reheat**
   - **Fan-powered VAV**
   - **Fan-powered VAV with hot water reheat**
   - **Fan-powered VAV with electric reheat**

a. All VAV box control applications shall be field-selectable such that a single controller may be used in conjunction with any of the above types of terminal units to perform the specified sequences of control. This requirement must be met in order to allow for future design and application changes and to facilitate system expansions. Controllers that require factory application changes are not acceptable.

b. The VAV box controllers shall be powered from a 24 VAC source and shall function normally under an operating range of 18 to 28 VAC (-25% to +17%), allowing for power source fluctuations and voltage drops. The BAS contractor shall provide a dedicated power source and separate isolation transformer for each controller unable to function normally under the specified operating range. The controllers shall also function normally under ambient conditions of 32_ to 122_F (0_ to 50_C) and 10% to 95%RH (non-condensing). Provide each controller with a suitable cover or enclosure to protect the intelligence board assembly.

c. The controller shall include a differential pressure transducer that shall connect to the terminal unit manufacturer's standard averaging air velocity sensor to measure the average differential pressure in the duct. The controller shall convert this value to actual air flow. Single point air velocity sensing is not acceptable. The differential pressure transducer shall have a measurement range of 0 to 4000 fpm (0 to 20.4 m/s) and measurement accuracy of ±5% at 400 to 4000 fpm (2 to 20 m/s), insuring primary air flow conditions shall be controlled and maintained to within ±5% of setpoint at the specified parameters. The BAS contractor shall provide the velocity sensor if required to meet the specified functionality.

d. Each controller shall include provisions for manual and automatic calibration of the differential pressure transducer in order to maintain stable control and insuring against drift over time. Calibration shall be accomplished by stroking the terminal unit damper actuator to a 0% position so that a 0 cfm air volume reading is sensed. The controller shall automatically accomplish this whenever the system mode switches from occupied to unoccupied or vice versa. Manual calibration may be accomplished by either commanding the actuator to 0% via the POT or by depressing the room sensor override switch. Calibration of the transducer at the controller location shall not be necessary.

e. The VAV box controller shall interface to a matching room temperature sensor as previously specified. The controller shall function to maintain space temperature to within ±1.5_F (.9_C) of setpoint at the room sensor location.

f. Each controller performing space heating control shall incorporate an algorithm allowing for modulation of a hot water reheat valve or cycling up to three (3) stages of electric reheat as required to satisfy space heating requirements. Each controller shall also incorporate an algorithm that allows for resetting of the associated air handling unit discharge temperature if required to satisfy space cooling requirements. This algorithm shall function to signal the respective DDC Controller to perform the required discharge temperature reset in order to maintain space temperature cooling setpoint.

7. Unit Conditioner Controllers: Shall support the following types of terminal units as a minimum:

- **Fan coil units**

a. Fan coil units may be of the following types:

- **2-pipe heating or cooling**
- **4-pipe heating or cooling**
- **Cooling and electric heating**
- **2-stroke cooling and hot water heating**

b. Unit conditioner controllers shall meet all requirements of paragraphs 6a, 6b, 6e and 6f, as previously specified for VAV box controllers.

2.6 PORTABLE OPERATOR'S TERMINAL (POT)

A. Provide one portable operator terminal with a minimum LCD display of 80 characters by 25 lines and a full-featured keyboard. The POT shall be handheld and plug directly into individual distributed control panels as described below. Provide a user-friendly, English language-prompted interface for quick access to system information, not codes requiring look-up charts.

B. Functionality of the portable operator's terminal connected at any DDC Controller:

1. Access all DDC Controllers on the network.

2. Backup and/or restore DDC Controller data bases for all system panels, not just the DDC Controller connected to.

3. Display all point, selected point and alarm point summaries.

4. Display trending and totalization information.

5. Add, modify and/or delete any existing or new system point.

6. Command, change setpoint, enable/disable any system point.

7. Program and load custom control sequences as well as standard energy management programs.

C. Functionality of the portable operator's terminal connected to any application specific controller:

1. Provide connection capability at either the ASC or a related room sensor to access controller information.

2. Provide status, setup and control reports.

3. Modify, select and store controller data base.

4. Command, change setpoint, enable/disable any controller point.

D. If the same portable operator's terminal cannot be used for both DDC Controllers and Application Specific Controllers, provide separate POTs to accomplish the above functional requirements.

1. Provide two of each type portable operator's terminals as specified in A above.

E. Connection of a POT to a distributed control processor shall not interrupt nor interfere with normal network operation in any way, prevent alarms from being transmitted or preclude centrally-initiated commands and system modification.

F. Portable operator terminal access to controller shall be password-controlled.

2.7 FIELD DEVICES

A. Room Temperature

Temperature monitoring range	**55 to 95 deg F**
Output signal	**Changing resistance**
Factory calibration point	**77 deg F**
Accuracy at calibration point	**+ 0.5 deg F**
Thermister element	**(+ 0.5 deg F)**

B. Liquid Immersion Temperature

Temperature monitoring range	**-40/+240 degrees F**
Output signal	**Changing resistance**
Accuracy at calibration point	**+/- 0.2% at calibration**
RTD material	**platinum**
RTD resistance	**1000 ohms**
Voltage	**0-11 VDC**

C. Duct (Averaging) Temperature

Temperature monitoring range	**-40/+240 degrees F**
Output signal	**Changing resistance**
Accuracy at calibration point	**+/- 0.2% at calibration**
RTD material	**platinum**
RTD resistance	**1000 ohms**
Probe length	**25 feet flexible**
Voltage	**0-11 VDc**

D. Outside Air Temperature

Temperature monitoring range	**-40/+240F**
Output signal	**changing resistance**
Accuracy at calibration point	**+/- 0.2% at calibration**
RTD Resistance	**1000 Ohms**
RTD Material	**Platinum**
Voltage	**0-11 VDC**

E. Differential Pressure Switches

1. Unit for fluid flow proof shall be Penn P74, United Electric J series, or equal.

Range	**8 to 70 psi**
Differential	**3 psi**
Maximum differential pressure	**200 psi**
Maximum pressure	**325 psi**

2. Unit for air flow proof shall be Powers SW141, Barber Coleman PC-301, or equal. Set point ranges .05" WG to 1.0" WG or 1.0" WG to 12.0" WG

F. Low Temperature Protection Thermostats

1. Provide low temperature thermostats of automatic or manual reset type as required by the sequence of operations, with sensing elements 8 to 20 feet in length depending upon actual duct size. Thermostat shall be designed to operate in response to the coldest 1 foot length of element regardless of temperature at other parts of element. Support the element properly to cover the entire duct width.

G. Pressure Transmitters

Output	**4-20mA, 2-wire loop**
Accuracy	**+/- 1.0% full scale**
Thermal effects	**+/- 0.033% FS (over 40 to 100 deg F range)**
Operating Temp	**0 to 175 deg F**

Utilize Setra Model C264 or preapproved equal

H. Damper and Valve Actuators

1. Damper and valve actuators shall be capable of providing smooth, proportional control under design temperature and pressure conditions. All actuators shall be electronic, 24 VDC and accept a standard 0 to 10 VDC or 4 to 20 Ma control signal. Actuators shall be factory selected, mounted and tested for proper operation based on unit size, type and torque requirements.

2. (Damper actuators for the VAV / Fan Powered boxes shall be 24 VDC, 3 point floating control, furnished and factory installed by the terminal box manufacturer.)

I. Control Valves

1. General: Provide factory fabricated control valves to type, material and pressure class as indicated or as determined by the manufacturer to satisfy the intended use or application.

2. Automated control valves shall be fully proportioning with modulating plug, unless otherwise specified. The valves shall be quiet in operation and fail safe in either the normally open or closed position in the event of power or signal failure. Valves shall employ cage type trim with seating and guiding surfaces for bottom and top of plug. Stems shall be stainless steel with brass plug and composition disk. Packing will be Teflon.

3. Valve CV's shall be determined by the EMCS contractor for a 5 psi pressure drop.

4. Furnish valves to the Mechanical Contractor for installation.

J. Outside Air Control Dampers

1. Provide low leakage control dampers with blade seals and stops equal to Ruskin model CD-36 as indicated on the plans, for installation by the Mechanical Contractor.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install system in accordance with manufacturers instructions and drawings. Mount control equipment at convenient locations and heights. Field verify exact location of all equipment, devices and/or openings and coordinate with other trades. Installation of the EMCS shall be performed by mechanics, electricians and technicians in the direct supervision of the supplier. Provide all necessary project management personnel for this section.

3.2 ON-SITE TESTING

A. Provide Engineer-approved operation and acceptance testing of the complete system. The Engineer will witness all tests.

B. Field Test: When installation of the system is complete, calibrate equipment and verify transmission media operation before the system is placed on-line. All testing, calibrating, adjusting and final field tests shall be completed by the installer.

3.3 TRAINING

A. The Contractor shall provide competent instructors to give full instruction to designated personnel in the adjustment, operation and maintenance of the system installed rather than a general training course. Instructors shall be thoroughly familiar with all aspects of the subject matter they are to teach. All training shall be held during normal work hours of 8:00 a.m. to 4:30 p.m. weekdays as follows:

B. Provide 8 hours of training for Owner's operating personnel. Training shall include:

1. Explanation of drawings, operations and maintenance manuals

2. Walk-thru of the job to locate control components

3. Operator workstation and peripherals

4. DDC Controller and ASC operation/function

5. Operator control functions including basic field panel programming

6. Operation of portable operator's terminal

7. Explanation of adjustment, calibration and replacement procedures

C. Since the Owner may require personnel to have more comprehensive understanding of the hardware and software, additional training must be available from the Contractor. If such training is required by the Owner, it will be contracted at a later date. Provide description of available local and factory customer training.

PART 4 - CONTROL SEQUENCE

4.1 GENERAL

A. Refer to the drawings for the control sequences.

End of Section

SECTION 23 11 00 FUEL GAS PIPING

PART 1 - GENERAL

1.1 SCOPE

A. Provide Natural gas piping systems complete as indicated on drawings and specified herein.

B. Drawing scales do not permit the indication of all offsets, fittings, sleeves, and similar items; however, these items shall be provided to form a complete and properly installed system at no additional cost to Owner.

C. System shall be complete in all respects and shall comply with applicable provisions of NFPA 54 and 58.

1.2 RELATION TO OTHER WORK

A. Refer to Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Refer to the Section entitled HANGERS AND SUPPORTS.

C. Piping systems requiring fixed locations and slopes shall have priority over those which do not have these requirements.

PART 2 - EQUIPMENT

2.1 PIPE, EXTERIOR

A. Black steel continuous weld below 2 inch size, and ERW seamless 2 inch and above, Schedule 40, conforming to ASTM A 53, Grade B, or ASTM A 106, Grade B.

B. Piping shall have factory applied plastic jacket to prevent corrosion.

2.2 PIPE, INTERIOR

A. Black steel continuous weld below 2 inch size, and ERW or seamless 2 inch and above, Schedule 40, Conforming to ASTM A 53, Grade B, or ASTM A 106, Grade B.

B. Copper tubing, type K or L, conforming to ASTM B 88.

2.3 FITTINGS

A. Steel Pipe:

1. Two Inch and Larger: Butt welding type scheduled to match adjacent piping.

2. 1-1/2 Inch and Smaller: Socket weld type 300 lb. class.

3. Final connections to equipment shall be screwed.

4. Surface Protection, Exterior: Protect welded pipe joints and fittings from corrosion using heat setting adhesive thermal shrink pipe sleeves sized to provide a minimum of a 2 inch overlap on undamaged plastic pipe coating. Acceptable: Raychem Type TPS.

B. Copper Tubing:

1. Wrought copper, solder joint, pressure type conforming to ANSI B16.22, soldered or brazed with a material having a melting point above 1000 degrees F.

2. Flared gas tube fittings.

2.4 VALVES

A. General: Valve numbers indicated are to set standard of quality and design. Valves as manufactured by other first line manufacturers may be submitted for approval.

B. Service cocks: Semi-steel body, brass plug, WP, 125 lb. WOG in compliance with ANSI Z21.15, 21.21, or B16.33. Acceptable: Rockwell 1092; McDonald SGOB.

2.5 DIELECTRIC ISOLATORS

A. Unions: For pipe sizes 2 inches and under, EPCO insulated unions with screw of solder joint connection to suit pipe and equipment.

B. Flanges: For pipe sizes 2-1/2 inches and over, Pilco Products Flange insulation sets with phenolic retainer; neoprene (compatible with gas) seal element; polyethylene sleeves; and double washer sets.

2.6 SPECIALTIES

A. Building Regulators: Provide individual building regulators which are UL listed for the intended service. Spring regulated self-contained type with high tensile iron body, die cast zinc spring case, die cast aluminum diaphragm casing with all steel parts plated to inhibit corrosion. Orifice, main disc and back disc as well as all regulator parts shall be replaced without removing the valve body from the line. Valve shall be equipped with high pressure shutoff assembly to function upon excess outlet pressure without discharge to atmosphere. Acceptable: Fisher Series S200, Type S203 size as scheduled.

B. Strainer: Provide "Y" pattern line strainers ahead of each pressure regulator. Strainers shall be selected for a pressure drop not to exceed 25 per cent of the pressure downstream of the regulator. Cast steel body with 150 lb. flanged end connections. Acceptable: Fisher Governor Type 260B with 304SS screen.

PART 3 - EXECUTION

3.1 GENERAL

A. Piping shall be run without traps or pockets and pitched 1 inch in 40 feet to drain back to main.

B. Piping shall be run parallel to the walls and ceilings in a neat and workmanlike manner and shall be offset as required to avoid interferences with structural features and work of other trades.

C. Piping shall be installed with provisions for expansion both horizontally and vertically.

3.2 SURFACE PROTECTION FOR UNDERGROUND PIPE

A. Protect welded pipe joints and fittings from corrosion using heat setting adhesive thermal shrink pipe sleeves or tape wrap sized to provide a minimum of two inches (2") overlap on undamaged plastic pipe coating.

3.3 PIPE SUPPORTS

A. Vertical gas piping shall be supported at each floor level, or twenty foot intervals, whichever is smaller.

3.4 HORIZONTAL GAS PIPING SHALL BE SUPPORTED WITH SUPPORT SPACING NOT TO EXCEED THE FOLLOWING:

STEEL PIPE		COPPER TUBING	
PIPE SIZE	SPACING	TUBE SIZE (OD)	SPACING
1/2”	6 FT.	3/8” TO 1/2”	4 FT.
3/4” TO 1”	8 FT.	5/8” TO 3/4”	6 FT.
1-1/4” AND UP	10 FT.	7/8” AND UP	8 FT.

3.5 JOINTS AND CONNECTIONS

A. General: Joints and connections shall be made permanently air, gas, and water tight.

B. Welded Joints: All pipe 2 inches and larger shall be butt welded. Cut pipe square using pipe cutting tool and carefully ream pipe to remove all burrs. Bevel ends of pipe and, after carefully aligning and setting of proper weld gap, tack weld to secure pipe and fittings in true alignment. Weld shall be of sound metal with tack welds removed in advance of finish weld. All welding shall be performed by welders certified in accordance with ANSI B31.1 with test

conducted by an approved testing laboratory. Copy of certification shall be available at job site.

C. Solder Joints: Cut pipe square using pipe cutting tool which does not crimp the pipe. Remove all burrs using pipe reamer and taking care not to flare the pipe end. Thoroughly clean the outside of the pipe and the interior of the valves and fittings using a fine sand cloth. Apply noncorrosive paste flux to the cleaned surfaces immediately and apply solder and heat in accordance with manufacturer's instructions to complete joint. Use care not to damage valves and follow the valve manufacturer's installation instructions explicitly.

D. Equipment Connections: Final connections to equipment shall be made with unions or flared gas fittings for pipe sizes 1-1/2 inches and under and with companion flanges for piped 2 inches and larger. Where incompatible piping materials come in contact, except for the use of valves, isolate the two materials using dielectric isolators as specified hereinbefore. Connections to equipment shall be made in accordance with details on drawings and the equipment manufacturer's installation instructions.

3.6 VALVES

A. All valves, cocks and similar items shall be installed in an easily accessible location.

B. All valves, locks and similar items shall be clearly identified.

3.7 TEST

A. Test piping systems, prior to backfill of any trenches, using compressed air at a pressure not less than 150 percent of working pressure. Soap each joint and prove tight.

End of Section

SECTION 23 21 00 CHILLED WATER PIPING

PART 1 - GENERAL

1.1 SCOPE

A. Provide chilled water piping systems as indicated on the drawings and specified herein. System shall be a minimum of 150 psig.

B. Drawings scales prohibit the indication of all offsets, fittings, sleeves, and similar items; however, these items shall be provided to form a complete and properly installed system at no additional cost to the Owner.

1.2 RELATION TO OTHER WORK

A. Refer to the Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Refer to the Section entitled HANGERS AND SUPPORTS.

C. Refer to the Section entitled THERMAL INSULATION.

D. Refer to the Section entitled Water treatment for closed loop systems.

E. Piping systems requiring fixed locations and slopes shall have priority over those which do not have both requirements.

1.3 SUBMITTALS

A. Refer to the Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Submit manufacturer’s literature on all system components.

PART 2 - PRODUCTS

2.1 PIPE

A. Interior: Black steel, seamless or ERW, standard weight, conforming to ASTM A 53.

B. Exterior: Black steel, seamless or ERW, standard weight, conforming to ASTM A 53 with factory applied plastic coating. Basis of Design: Republic Steel "X-Tru-Coat".

2.2 FITTINGS

A. Screwed: Malleable iron, 150 and 300 lb., ASTM A 47. Unions shall be 250 lb. (minimum) ground joint type. All couplings, regardless of size shall be taper tapped; i.e., coupling 2 inches and smaller shipped with pipe are not acceptable for use in the piping system.

B. Welding: Forged, seamless, black steel, standard weight, long radius, conforming to ASTM A 234. Weldolet fittings, as manufactured by Bonney Forge, may be used in lieu of forged tees where branch connections are not larger than three-quarters the size of main pipe.

C. Flanges: Forged carbon steel, 150 lb. welding neck type conforming to ASTM A 181, grade 1. Flanges shall have raised face and gaskets conforming to ANSI B16.5.

2.3 DIELECTRIC ISOLATORS

A. Unions: For pipe sizes two inches and under; EPCO or Rockford Eclipse insulated unions.

B. Flanges: For pipe sizes two and one-half inches and over; Plico Products, flange insulation sets with; phenolic retainer, nitrile rubber seal element, polyethylene sleeves and double washer sets.

2.4 VALVES

A. General: Valve numbers indicated are to set standard of quality and design. Valves as manufactured by other first line manufacturers may be submitted for approval.

B. Ball Valves:

1. Ball Valves (2" and smaller): Bronze body, stainless steel ball and stem, teflon seats and rings, and threaded ends. Where valve is located in an insulated line, provide extended tee handle with memory stop. Acceptable: Appollo No. 70, Nibco No. T-580-66, Watts No. B-6000-SS.

2. Ball valves (2-1/2" to 4"): Bronze body, stainless steel ball and stem Teflon seats and rings, and flanged ends. Where valve is located in an insulated line, provide extended tee handle with memory stop. Acceptable: Apollo No. 70, Nibco No. T-580-66, Watts No. B-6000-SS.

C. Globe Valves:

1. Valves 2-1/2 Inches and Larger: Flanged, iron body, yoke bonnet, bronze trim and disc, 125 lb. SWP, 200 lb. WOG. Acceptable: Crane No. 351, NIBCO No. F-718, or Hammond No. IR 116.

2. Valves 2 Inches and Smaller: Screwed, bronze body, union bonnet composition disc, 300 lb. WOG. Acceptable: Crane No.7, NIBCO No. T-235-W, or Hammond No. IB 413.

D. Check Valves:

1. Valves 2-1/2 Inches and Larger: Flanged, globe pattern silent, non-slam type with fully guided bronze disc and conical stainless steel spring. Bodies shall be ASTM A 126 Class B iron (semi-steel), 175 lb. WOG. Acceptable: Mueller Steam Specialty #105-AP.

2. Valves 2-1/2 Inches and Smaller: Screwed, bronze body, swing, screwed cap, TFE disc, Y Pattern, 150 lb. SWP, 300 lb WOG. Acceptable: Crane No. 11, NIBCO No. T-433-Y, or Hammond No. IB 946.

E. Butterfly Valves:

1. Pattern: Valves shall be of the threaded lug body type. All valves shall have extended necks for insulation clearance. Valves shall conform to MSS-SP-67.

2. Body: Cast iron, ASTM A 126, Class B.

3. Disc and stem: #316 Stainless Steel ASTM A 276; Buna-N or EDPM stem seals.

4. Seat: Buna-N or EDPM; temperature range of 0°F. to 250°F. All valves shall be bubble tight shut-off at pressure differentials of 150 psig sizes in 2” through 24”.

5. Operators, manual:

a. Valves 2" Through 6": Shall have infinite position lever with memory stop, and safety lock-out.

b. Valves 8" and Larger: Shall have worm gear type operator with position indicator, memory stop, and safety lock-out. Provide chain wheel, hand wheel, hand crank, or 2” square nut operating mechanisms as indicated on the drawings, or dictated by the valve locations.

c. Provide stem extensions (in addition to specified insulation clearance extension) as necessary to place operators in an easily accessible location free of interference with adjacent piping, equipment, structure, and the like.

6. Basis of Design: Dezurik #BRS; Keystone Fig. #122.

F. Plug Valves: Semi-steel, lubricated type, with bolted cover or gland position indication dial full port, and teflon coated plug, 200 lb. WOG. Valves 2 inches and smaller, screw pattern; 2-1/2 inches and larger, flanged end.

2.5 TEST STATIONS - PRESSURE/TEMPERATURE

A. Provide 1/4" NPT fitting (Test Plug) of solid brass at indicated locations. Test plug shall be capable of receiving either a pressure or temperature probe 1/8" o.d. Valve core shall be Nordel for temperatures 350 degrees F and shall be rated zero leakage from vacuum to 1000 psig.

B. One (1) Master Test Kit shall be provided to the Owner. Kit shall contain one (1) 2-1/2" test gauge of suitable range, one (1) gauge Adapter w/1/16" or 1/8" o.d. probe, and two (2) 5" stem pocket testing thermometers - one (1) O degrees F - 220 degrees F and one (1) 25 degrees F to 125 degrees F.

PART 3 - INSTALLATION

3.1 GENERAL

A. Piping shall be run without traps or pockets and pitched 1 inch in 40 feet in the direction of flow.

B. Interior piping shall be run parallel to the walls and ceilings in a neat and workmanlike manner and shall be offset as required to avoid interferences with structural or architectural features and the work of other trades.

C. Exterior piping (above and below grade) shall essentially be routed and located as indicated on the drawings; however, actual placement shall be verified by confirming exact location of structures and other utilities in the field and by careful layout prior to execution of the work..

3.2 EXCAVATION AND BACKFILL

A. Refer to DIVISION 2 - SITEWORK.

3.3 SUPPORT

A. Hangers for steel piping systems shall not be placed at greater than the following intervals:

1. Pipe 1 Inch and Smaller: Eight foot (8') centers and not more than two feet (2') from a change in direction (offsets, elbows, and tees).

2. Pipe 1-1/4 Inch Through 2-1/2 Inches: Ten foot (10') centers and not more than two feet (2') from a change in direction (offsets, elbows, and tees).

3. Pipe 3 Inches Through 8 Inches: Fourteen foot (14') centers and not more than two feet (2') from a change in direction (offsets, elbows, and tees).

4. Pipe 10 Inches Through 16 Inches: Twenty-two foot (22') centers and not more than three feet (3') from a change in direction (offsets, elbows, and tees).

5. Pipe 18 Inches Through 30 Inches: Twenty-eight foot (28') centers and not more than four feet (4') from a change in direction (offsets, elbows, and tees).

3.4 EXPANSION AND CONTRACTION

A. Piping shall be installed with provisions for expansion both horizontally and vertically in all long runs including runouts from risers.

B. Essentially the provisions shall take the form of expansion loops, as indicated on the drawings; however, in certain portions these provisions shall take the form of expansions connectors.

3.5 VENTS AND DRAINS

A. Vents and drains shall be provided at high and low points, respectively, in the system.

B. Provide ball valves (3/4") with hose thread connector (adapter) at each vent and drain point.

3.6 JOINTS AND CONNECTIONS

A. General: Joints and connections shall be made permanently air, gas, and water tight.

B. Screwed Joints: Shall be used on pipe 2" and smaller except where noted on schedules and where flanged connections to equipment or valves are required. Cut pipe square using pipe cutting tool and carefully ream pipe to remove all burrs. Cut a complete thread, using sharp dies properly set and centered, while applying oil graphite cutting lubricant.

C. Welded Joints: All pipe 2-1/2" and larger shall be welded. Cut pipe square using pipe cutting tool and carefully ream pipe to remove all burrs. Bevel ends of pipe and, after carefully aligning and seeing of proper weld gap, tack weld to secure pipe and fittings in true alignment. All weld shall be of sound metal with tack welds removed in advance of finish weld. All welding shall be performed by welders certified in accordance with ANSI B31.1 with test conducted by an approved testing laboratory. Copy of certification shall be available at job sites.

D. Equipment Connections:

1. General: Connections to equipment shall be made in accordance with details on the drawings and the equipment manufacturer's installation instructions. Where incompatible piping materials come in contact, except for the use of valves, isolate the two materials using dielectric isolators. Provide roughing materials and connect equipment under other sections of the specifications or by the Owner as indicated on the drawings, in the schedules, and as specified.

2. 2 Inches and Smaller: Shall be made with unions.

3. 2-1/2 Inches and Larger: Shall be made with flanges.

3.7 INSTRUMENTATION AND SPECIALTY ITEMS

A. Thermometers, gauges, gauge cocks, gauge valves, instrument wells, flow stations, flow switches, control valves, and similar items which may be specified in other Sections shall be installed complete, including the provision of standard pipe fittings as may be required, as work of this Section.

B. Installation of these items shall be in strict accordance with the manufacturer's installation instructions.

C. Provide pressure/temperature test stations at the following locations:

1. Inlet and outlet of all water coils in fan coil units, terminal units, fan terminal units, duct mounted coil units, etc.

2. Inlets and outlets of all small strainers at fan coil units, etc.

3. At other locations indicated on the drawings.

4. Do not provide pressure/temperature stations at locations where thermometers and pressure gauges have been provided.

5. Install all pressure/temperature stations on the equipment side of the equipment isolation valves.

3.8 VALVES

A. All valves, balancing cocks and similar items shall be installed in an easily accessible location. Provide access panels for all concealed valves and items requiring access.

B. Ball Valves: Provide where indicated on the drawings, and at locations requiring non-throttling control (open or closed only).

C. Globe Valves: Provide where indicated on the drawings, and at locations requiring frequent adjustment of throttling control of flow.

D. Check Valves: Provide where indicated on the drawings, and where required by the manufacturer's installation recommendations for specific items of equipment.

E. Butterfly Valves: Provide where indicated on drawings and at equipment connections to the piping system of 4” and larger. Provide chain wheel operators on valves larger than 6” and located more than six feet above the operator’s working platform.

3.9 TESTING

A. Test piping systems prior to the application of any insulation and prior to their being rendered inaccessible by the progress of the work.

B. Pressure test the chilled water piping at one hundred fifty percent (150%) of working pressure or one hundred psig whichever is greater. The system shall hold the pressure for such time as required to indicate its integrity to the satisfaction of the Engineer but no case less than one hour.

C. Conduct testing on new piping, prior to connection of new piping to existing piping system, or connection to new or existing equipment.

3.10 CLEANING AND FILLING

A. Before connecting new piping into existing piping system:

1. Flush with potable water and drain.

2. Clean and inspect all strainers; refill with potable water, venting all air.

B. Refer to the Section entitled WATER TREATMENT FOR CLOSED LOOP SYSTEMS.

End of Section

SECTION 23 21 30 THERMOMETERS

PART 1 - GENERAL

1.1 SCOPE

A. Provide thermometers for temperature indication at the points as indicated on drawings and as specified herein.

1.2 RELATION TO OTHER WORK

A. Refer to Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

1.3 SUBMITTALS

A. Refer to Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Provide schedule of ranges and proposed locations.

C. The equipment selected is indicated in the Basis of Design.

D. Equal products by other manufacturers may be submitted for approval.

PART 2 - MATERIALS AND EQUIPMENT

2.1 THERMOMETERS

A. HVAC Application: Adjustable angle, nine inch (9") long scale, organic fill type (blue color) with range selected to read center scale at normal operating conditions; extension necks and bulb style selected to suit application; armored elements on duct thermometers. Basis of Design: H.O. Trerice Co. A005 or A015.

2.2 SEPARABLE SOCKETS

A. Provide for each thermometer in piping system. Sockets: Brass with extension neck to suit thickness of insulation and finish 3/4 NPT.

2.3 DUCT FLANGE

A. Provide for each thermometer in duct system. Provide flanges with gaskets.

2.4 THERMOMETER TEST WELLS

A. Brass with extension neck to suit insulation; cap with chain; 1/2 inch NPT; extension neck where necessary to penetrate insulation.

PART 3 - INSTALLATION

3.1 GENERAL

A. Install test wells, separable sockets, duct flanges and thermometers in accord with manufacturer's instructions.

B. Locate in such a manner (adjusting mounting angle as required) as to permit easy reading of all thermometers associated with a single heat transfer device from a single point on the floor (or working platform).

C. Install in such a manner as to give accurate reading of actual conditions.

D. Make allowance for proper (unrestricted) flow by installing in oversized fitting in line sizes two inches (2") and under.

3.2 THERMOMETER TEST WELL LOCATIONS

A. Provide thermometer test wells at locations indicated on the drawings.

3.3 THERMOMETER LOCATIONS

A. Provide thermometers at locations indicated on the drawings.

End of Section

SECTION 23 21 30 GAUGES

PART 1 - GENERAL

1.1 SCOPE

A. Provide pressure gauges for indication of operating conditions at such points as are indicated on drawings and as specified herein.

1.2 RELATION TO OTHER WORK

A. Refer to the Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

1.3 SUBMITTALS

A. Refer to the Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Provide schedule of ranges and proposed locations.

C. The equipment selected is indicated in the Basis of Design.

D. Equal products by other manufacturers may be submitted for approval.

PART 2 - MATERIALS AND EQUIPMENT

2.1 GAUGES

A. Four and one-half inch (4-1/2") diameter with cast aluminum black finished flangeless case and chrome ring. Bourdon tube: phosphor bronze silver soldered to socket and tip. Socket: forged brass bottom outlet type. Movement: stainless steel rotary type with delrin sector and bushings and micrometer type pointer. Basis of Design: H.O. Trerice Co. 500X.

2.2 GAUGE VALVES

A. Ball Valves:

1. Ball Valves (2" and smaller): Bronze body, stainless steel ball and stem, teflon seats and rings, and threaded ends. Where valve is located in an insulated line, provide extended tee handle with memory stop. Acceptable: Appollo No. 70, Nibco No. T-580-66, Watts No. B-6000-SS.

2. Ball valves (2-1/2" to 4"): Bronze body, stainless steel ball and stem Teflon seats and rings, and flanged ends. Where valve is located in an insulated line, provide extended tee handle with memory stop. Acceptable: Apollo No. 70, Nibco No. T-580-66, Watts No. B-6000-SS.

B. Needle Valve: Brass, needle valve, round knurled handle, 1/4 inch male x 1/4 inch female NPT. Basis of Design: H.O. Trerice Co. 735 Type FFG.

2.3 PRESSURE SNUBBER

A. Brass, 1/4 inch male x 1/4 inch female NPT. Basis of Design: H.O. Trerice Co. 872-2.

2.4 COIL SYPHONS

A. Brass, 1/4 inch male NPT. Basis of Design: H.O. Trerice Co. 885-2.

PART 3 - INSTALLATION

3.1 GENERAL

A. Install pressure gauges, gauge valves, and snubbers in accordance with manufacturer's instructions.

B. Locate devices in such a manner as to permit easy reading of all gauges associated with a single piece of equipment from a single point on the floor (or working platform).

3.2 PRESSURE GAUGES

A. Install in such a manner as to give an accurate reading of the actual conditions and to permit easy access to gauge and gauge valve.

B. Where mounting location does not permit rotation of the gauge for removal, install using the union type (880) gauge valve.

C. Range shall be selected to read near center at normal operating conditions.

3.3 GAUGE VALVES

A. Install using brass nipples of sufficient length to raise gauge valve clear of insulation and finish.

B. Provide in valve stations to permit installation of gauges (either permanent or temporary) for pressure indication.

C. Install at supply branch take-offs from mains for chilled water, hot water and steam.

D. Install at return branches to mains for chilled water and hot water.

3.4 SNUBBERS

A. Provide on gauges as required to prevent pulsation (all gauges at suction and discharge of pumps).

3.5 GAUGE LOCATIONS

A. Provide permanent gauges, with gauge valves, at the locations indicated on the drawings.

B. Provide permanent gauges, with gauge valves, on the entering and leaving side of each pump, coil and heat exchanger.

End of Section

SECTION 23 21 30 REFRIGERANT PIPING AND ACCESSORIES

PART 1 - GENERAL

1.1 SCOPE

A. Provide refrigerant piping systems and accessories, complete in all respects, between the outdoor units and the indoor units.

B. Drawing scales do not permit the indication of all offsets, fittings, sleeves, and similar items; however, these devices shall be provided as work of this Section at no change in contract price.

1.2 RELATION TO OTHER WORK

A. Refer to Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Refer to the Section entitled HANGERS AND SUPPORTS.

C. Refer to the Section entitled THERMAL INSULATION.

D. Piping systems requiring fixed locations and slopes shall have priority over those that do not have both requirements.

1.3 SUBMITTALS

A. Provide submittals on all components of the systems.

B. Where compliance with an industry, society, or association standard is specified or indicated, certification of such compliance shall be submitted.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pipe:

1. Hard Copper: Shall be refrigerant grade copper, dehydrated and sealed, seamless, hard drawn, Type L (ACR).

2. Soft Copper: Shall be refrigerant grade, dehydrated and sealed, soft copper tubing, Type K (ACR).

B. Fittings: Refrigerant grade, wrought copper, long radius, solder joint, pressure type conforming to ANSI B16.22, soldered or brazed with a solder material having a melting point above 1000 degrees F.

2.2 EQUIPMENT

A. Refrigerant Filter-Dryer: A full flow, sealed type reversible filter dryer designed for liquid line installation in heat pumps suitable for 500 psig, molded porous core to remove moisture, acids, oil sludge, and varnish, filter out scale, sludge, carbon, or other foreign matter. Size for less than two (2) psi pressure drop.

B. Refrigerant Charging Valve:

1. A refrigerant charging valve shall be located between the receiver or condenser outlet valve and the liquid line dryer.

2. The charging valve shall be of the packed receiver type, and shall be provided with a flare seal cap.

C. Moisture Indicator/Liquid Indicator:

1. A combination moisture indicator and liquid line sight glass, of the double port type, shall be installed in the liquid line leaving the receiver, or condenser, upstream of the dryer.

a. Sight glass assembly shall include seal caps.

PART 3 - INSTALLATION

3.1 INSTALLATION

A. Pipe: The refrigerant pipe sizes shall comply with the manufacturer's recommendations, but shall not be less than the sizes indicated. Pipe shall be run in accordance the good practice and trapped only where indicated or recommended by the equipment manufacturer.

B. Refrigerant Specialties: Refrigerant valves, driers, expansion valves, and similar items shall be provided with the equipment. Where refrigerant access valves are not furnished by the manufacturer, they shall be field provided to enable charging and checking the systems.

C. Joints and Connections: All joints and connections shall be made permanently refrigerant tight.

1. Solder Joints: Cut tubing square using tubing cutters, with sharp cutting wheels, so as not to crimp the tubing ends. Remove all burrs using a pipe reamer and taking care not to flare the ends of the tube. Thoroughly clean the outside of the pipe and the inside of the fitting using a fine sand cloth. Apply non-corrosive paste flux to the cleaned surfaces immediately and apply silver solder and heat in accordance with manufacturer's instructions. Use care not to damage equipment or refrigerant specialty items when making up joints (protect from excessive heat).

2. Below Grade Piping: Where refrigerant piping must be installed below grade or below floor slabs on grade, piping shall be run in PVC conduit. Piping in conduit shall be soft drawn with no joints below grade.

D. Hangers and Supports: Isolate copper tubing from contact with any dissimilar metals. Hangers for copper piping systems shall not be placed at greater than the following intervals:

1. Pipe 1 Inch and Smaller: Six foot (6') centers and not more than two feet (2') from a change in direction (offsets, elbows, and tees).

2. Pipe 1-1/4 Inch and Larger: Eight foot (8') centers and not more than two feet (2') from a change in direction (offsets, elbows, and tees).

3.2 EVACUATION AND CHARGING

A. Piping systems shall be evacuated and charged as follows:

1. Charge the system with dry nitrogen and leak test all joints including factory piping within the units. Test pressure to be minimum of 250 psi.

2. Identify leaks with soap solution. Repair all leaks by disassembling and remaking the joint.

3. After all leaks are corrected, evacuate the system to an absolute pressure of 29" mercury.

4. System shall hold this vacuum for two hours with no noticeable rise in pressure.

5. Charge the system in the manner and with the type and amount of refrigerant recommended by the manufacturer and in accordance with accepted refrigeration practice.

3.3 PROTECTION OF WORK

A. Protect all refrigerant piping systems from damage prior to final acceptance and make repairs to damaged systems at once, completely evacuating and charging as specified herein.

End of Section

SECTION 23 26 00 CONDENSATE DRAIN PIPING

PART 1 - GENERAL

1.1 SCOPE

A. Provide condensate drain piping from cooling coil drain pans and auxiliary drain pans. Drain piping shall be routed to the nearest roof drain or floor drain except as otherwise indicated on the drawings.

B. Contractors shall use either the copper or PVC systems specified, provided it is in compliance with all codes and ordinances. PVC shall not be used in return air plenums.

1.2 RELATION TO OTHER WORK

A. Refer to Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Refer to the Section entitled HANGERS AND SUPPORTS.

C. Refer to the Section entitled Thermal Insulation.

D. Piping systems requiring fixed locations and slopes shall have priority over those which do not have both requirements.

1.3 SUBMITTALS

A. Provide submittals on all materials and equipment to be used in these systems.

B. Where compliance with an industry, society or association standard is specified or indicated, certification of such compliance shall be submitted.

PART 2 - MATERIAL

2.1 PIPE

A. Copper: Type M hard drawn copper conforming to ASTM B 88.

B. PVC: Polyvinyl Chloride (PVC) conforming to ASTM D 2665.

C. Refer to the Section entitled SOIL, WASTE, VENT, AND DRAIN SYSTEM for pipe larger than 2 inches.

2.2 FITTINGS

A. Copper: Wrought copper, solder joint, pressure type conforming to ANSI B16.22.

B. PVC: Polyvinyl Chloride (PVC) conforming to ASTM D 2665.

PART 3 - INSTALLATION

3.1 GENERAL

A. Piping shall be sloped uniformly toward drain, and provided with trap seal having a depth, in inches, equivalent to the total static pressure of the respective fan system.

B. Traps shall be assembled using elbows and tees with threaded plugs to permit cleaning of trap and drain line.

C. Piping shall be installed in a neat and workmanlike manner and shall be not smaller than full size of the equipment drain connection or three-quarters inch (3/4") whichever is larger.

3.2 PIPING SYSTEMS

A. Underground Piping: PVC or hub and spigot cast iron at contractor's option. PVC piping shall not rise above building slab more than one foot.

B. Above Ground Piping: Copper. Above ground piping not in return air plenums may be PVC.

3.3 JOINTS AND CONNECTIONS

A. General: Joints and connections shall be made permanently air, gas, and water tight.

B. Solder Joints: Cut pipe square using cutting tool which does not crimp pipe. Remove all burrs using pipe reamer and taking care not to flare the pipe end. Thoroughly clean the outside of pipe and the interior of the fittings using a fine sand cloth. Apply noncorrosive paste flux to the cleaned surfaces immediately and apply solder and heat, in accordance with manufacturer's instructions, to complete joint.

C. Socket Joints: Cut piping square using pipe cutting tool. Remove all burrs using a pipe reamer or file. Thoroughly clean outside of pipe and inside of fittings with PVC solvent. Apply PVC cement manufacturer’s recommendations.

D. Equipment Connections:

1. General: Connections to equipment shall be made in accordance with details on the drawings and the equipment manufacturer's installation. Where incompatible piping materials come in contact, except for use of valves, isolate the two materials using dielectric isolators. Provide roughing materials and connect equipment under other sections of the specifications or by the Owner as indicated on the drawings, in the schedules, and as specified.

2. 2 Inches and Smaller: Shall be made with unions.

3. 2-1/2 inches and Larger: Shall be made with flanges.

3.4 SUPPORT

A. Hangers for copper piping systems shall not be placed at greater than the following intervals:

1. Pipe 1 Inch and Smaller: Six foot (6') centers and not more than two feet (2') from a change in direction (offsets, elbows, and tees).

2. Pipe 1-1/4 Inch Through 2-1/2 Inches: Eight foot (8') centers and not more than two feet (2') from a change in direction (offsets, elbows, and tees).

B. Hangers for PVC piping systems shall not be placed at greater than the following intervals:

1. Pipe 1 Inch and Smaller: Four foot (4') centers and not more than two feet (2') from a change in direction (offsets, elbows, and tees).

2. Pipe 1-1/4 Inch Through 2-1/2 Inches: Five foot (5') centers and not more than two feet (2') from a change in direction (offsets, elbows, and tees).

3.5 ROUTING

A. Unless otherwise indicated, route pipe discharge as follows:

1. Roof Mounted Equipment: To nearest roof drain.

2. Interior Equipment: To nearest floor drain, janitor's closet, or as shown.

B. Traps: Provide deep seal P-trap or fabricate P-trap from 1/4 bends to provide a minimum of a 2 inch seal when the air conditioning unit's static pressure is acting on the seal. This is intended to mean 2 inches water seal plus the static pressure of the unit listed in the AHU schedule. If the unit static pressure is less than 1 inch water then the trap shall be 3 inches deep.

C. Piping shall be run with slope of 1/4 inch per foot.

3.6 PROTECTION OF WORK UNTIL FINAL ACCEPTANCE

A. Contractor shall protect the drain piping from damage, the entrance of dirt and construction debris, and shall keep drains open during periods of use from the time of installation until final acceptance.

End of Section

SECTION 23 31 13 DUCTWORK, LOW, MEDIUM PRESSURE SHEET METAL

PART 1 - GENERAL

1.1 SCOPE

A. Provide complete low-pressure and medium-pressure sheet metal duct systems as indicated on the drawings and specified herein.

B. Drawings scales prohibit the indication of all offsets, fittings, and like items; however, these items shall be installed as required for the actual project conditions at no change in contract price.

C. Low-pressure duct is defined as ductwork designed for up to 2”wg of positive (or negative) static pressure. Medium-pressure duct is defined as ductwork designed for static pressures greater than low-pressure duct. Duct size is defined as the dimensions of the free air passage; i.e., a labeled 12”x 6” internally lined duct has a 12”x 6” air passage, is lined with 1” duct liner, and measures 14”x 8” outside (metal duct) dimensions.

D. Include the work of the Section entitled FACTORY BUILT DUCT AND FITTINGS when included in this Division.

1.2 RELATION TO OTHER WORK

A. Refer to Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Refer to Section entitled THERMAL INSULATION.

1.3 SUBMITTALS

A. Submit complete manufacturers data on all items specified herein, including method(s) of sealing penetrations (both fire and/or smoke rated and non-rated) of partitions, walls, and floors, that will be provided in this project. Submittal data shall annotated as to where the material, method, or item is intended for use.

B. The following detailed shop drawings are required as a minimum:

1. Prepare and submit for approval completely detailed and coordinated shop drawings of the supply and return ductwork from each air handling unit through its transitions, bends, and elbows until such ducts are extended beyond the air handling unit equipment area and/or congested area. These shop drawings shall include the work of all other trades proposed for the congested area.

2. When available, the Engineer will provide electronic copies of the drawing(s) in the Engineer’s standard computer assisted drawing format, for the Contractor’s use in preparing these shop drawings. Submittal drawings shall be at a scale of ¼” = 1’-0”, or larger.

3. Prepare and submit shop drawings for each type of air inlet and/or discharge, and its connections, fittings, and accessories as it is to be generally installed. This shall be coordinated with the actual equipment and air distribution products to be used on this project.

1.4 REGULATIONS, CODES, STANDARDS, AND ORDINANCES

A. Ductwork construction and installation shall conform to the requirements of the SMACNA manual "HVAC Duct Construction Standards, Metal and Flexible (1995)", except where specifically indicated otherwise in the Contract Documents.

B. Ductwork construction and installation shall comply with NFPA-90A.

C. Fire damper construction and installation shall comply with UL-555.

D. Smoke damper construction and installation shall comply with UL-555S.

1.5 MANUFACTURER

A. Specific premanufactured items considered in the design of this project have been identified as "Basis of Design".

B. Equal products of other manufacturers may be submitted for approval unless specifically noted otherwise.

PART 2 - MATERIALS AND EQUIPMENT

2.1 SHEET METAL DUCTWORK

A. Low Pressure Ductwork: Systems operating at two inches of water static pressure (2" wg.) or less shall be constructed in accordance with the SMACNA manual for 2" static pressure classification, with the following modifications.

1. Material: G-90 coated galvanized steel, lock-forming grade, conforming to ASTM A-527.

2. Crossbreaking or Beading: Blanket-type exterior duct insulation shall not eliminate the requirement for crossbreaking or beading unbraced duct panels.

3. Sealing: Seal all joints and seams with Class A sealing method and material.

B. Medium Pressure Ductwork: Systems operating at specific static pressure classes above 2" wg. as indicated by the SMACNA duct pressure class designations, shall be constructed in accordance with the SMACNA requirements for the applicable pressure class, with the following modifications.

1. All duct work downstream of air handling units serving VAV or fan terminal units shall be considered as medium pressure duct systems, and

shall be constructed for not less than the scheduled total static pressure of the fan supplying the duct system, unless noted otherwise.

2. Material: G-90 coated galvanized steel, lockforming grade, conforming to ASTM A-527.

3. Crossbreaking: Blanket-type exterior duct installation shall not eliminate the requirement for crossbreaking unbraced duct panels.

4. Sealing: All joints and seams shall be sealed with a Class A sealing method and material.

2.2 FLEXIBLE DUCTS

A. Flexible ducts shall consist of a zinc coated spring steel helix permanently bonded to a full interior laminate of fiberglass, aluminum foil, and polyester fabric liner to form the duct core with positive interior air seal. Ducts shall be NFPA 90A, Class 1 (UL 181), rated for not less than 5000 fpm air velocity. Duct shall be rated for an air temperature range of not less than 20oF to 140oF.

1. Core shall be covered with factory applied one inch, one pound per cubic foot fiberglass insulation with an R value of 6.0 sheathed in a seamless exterior Class 1 fire retardant polyethylene material vapor barrier jacket. Jacket vapor pressure shall be rated at not more than 0.05 perms. Duct shall be rated at not more than 25/50 flame spread/smoke developed per ASTM E-84.

2. Pressure Ratings: Duct shall have a positive working pressure of not less than 10" wg for sizes 4" through 20" in diameter per UL-181. Duct shall be rated for not less than 6” wg recommended operating positive pressure for 4” through 12”, and not less than 4” wg recommended operating positive pressure for 14” through 20”, in accordance with ADC FD-R1 Test Code. Negative static pressure shall be not less than ¾” wg.

3. Duct Main To Flex Duct Connections: Fittings shall be galvanized sheet metal spin-in fittings with quadrant damper and without air scoops, or shall be rectangular-to-round fittings with quadrant dampers. Damper operators shall be extended 2” to clear insulation on insulated ductwork. Duct shall be NFPA 90A, Class 1 (UL 181). Delete the damper for runouts between the supply main and terminal units. Runouts to terminals shall be limited to lengths of two feet (2'-0") unless otherwise noted.

B. Basis of Design: Flexmaster Type 3M-insulated, or equal.

2.3 DUCT CONNECTOR SYSTEMS

A. Prefabricated duct connector systems for rectangular, round, or oval duct which equal or exceed the SMACNA requirements may, at Contractor's option, be used in the fabrication of the rectangular duct systems of this project.

B. Basis of Design: Ductmate Industries, Inc., "Ductmate Systems" or equal.

2.4 DUCT SYSTEM ACCESSORIES

A. General:

1. Provide all necessary duct accessories to assure proper balance, quiet distribution, and minimization of turbulence, noise and pressure drop for all supply, return, exhaust and ventilation air quantities indicated.

2. Accessories shall be recommended by the manufacturer for the application.

B. Duct Sealer:

1. Water-based fiber-reinforced mastic composition, with no harmful fumes.

2. Adhere to metal, fiberglass ductboard, and flexible duct joint surfaces.

3. UL classified non-flammable, suitable for indoor or outdoor use, suitable for operating temperatures of –20 to +180 degrees F.

4. Basis of Design: United McGill “UNIMASTIC” HVAC Duct Sealer or equal.

C. Flexible Duct Connections:

1. Provided where air handlers, fans, blowers, and fan terminals connect to their ductwork.

2. At least 4 inches long connected on each side to metal (either metal ductwork, air handling apparatus, or heavy gauge steel sleeves). Connections shall be rated for static pressure equal or exceeding the rating of the duct in which they are installed.

3. Provide braided copper bonding strap equal to Thompson Lightning Protection, Inc., No. A588.

4. Basis of Design: Ventfabrics, Inc., "Ventglas Metaledge" or equal.

D. Metal Turning Vanes:

1. Provide in all elbows, bends and tees of all supply air ducts whether or not shown in detail; provide in all elbows, bends and tees of all other ducts where such ducts convey air at greater than 700 fpm design maximum air velocity.

2. Constructed of aluminum, steel with corrosion resistant coating, or galvanized steel; with adequate rigidity and strength to be completely flutterproof; properly designed; permanently fixed type.

3. Turning vanes shall meet the requirements of SMACNA small single vane schedule for 2” radius, 1-1/2” spacing, and 24 gauge.

E. Extractors:

1. Provide at low-pressure branch duct take-offs.

2. Constructed of aluminum, steel with corrosion resistant coating, or galvanized steel; multivaned; adjustable; properly designed to deflect, proportion and direct the indicated air quantities to the branch duct and/or to the registers, grilles or other outlets without causing objectionable noise or pressure drop.

3. Provided with devices for adjusting and securing the position of these deflectors; these devices shall allow adjustment of the deflectors from outside the completed ductwork without necessity for puncturing or otherwise penetrating ductwork and/or its vapor barrier. Provide minimum of 2” device extensions when used on insulated ducts.

4. Basis of Design: Titus AG-45 or equal.

F. Manual Volume Dampers:

1. Except those specified as being integral with each register, diffuser and other air outlet or inlet device.

2. Provide in the complete low-pressure air distribution system(s) (including ductwork, return air plenums, etc.) to allow complete balancing of the air supply, return, ventilation and exhaust system(s). Provide in medium pressure supply air duct systems where indicated on the drawings.

3. Opposed blade type; constructed of galvanized steel, or steel with a sprayed or dipped aluminum rust-resistant finish; flutterproof; with 8" maximum blade width; fully adjustable, and with locking device.

4. Provide operator so that all damper adjustments can be made from outside the completed ductwork without necessity for puncturing or otherwise penetrating the ductwork and/or its vapor barrier. Provide 2” operating handle extension for insulated ducts.

5. Basis of Design: Ruskin MD-35 or equal.

G. Duct Access Doors, Low Pressure:

1. Provide for:

a. Each manual and motorized damper;

b. Each fire damper and/or smoke damper;

c. At intervals of 20 feet for duct cleanout purposes;

d. And at other locations where access is necessary.

2. Factory prefabricated double wall insulated type of 24 US gauge galvanized steel (of same or thicker gauge than ductwork panel in which installed, whichever is greater). Single wall type may be used for uninsulated duct systems. Minimum size shall be as large as is compatible with duct size, and to permit proper access.

3. Doors shall be provided with hand-operated adjustable tension catches and shall be completely gasketed around their perimeters. Provide hinged doors, or provide attachment cable or chain for each removable door. Both types may be provided on project to fit the space requirements.

4. Basis of Design – Low Pressure: Ruskin.

   a. Removable: ADC-14 & ADC-24

   b. Hinged: ADH-14 & ADH-24

H. Duct Access Doors, Medium Pressure:

1. Provide for each fire damper and/or smoke damper, and at other locations where access and/or pressure relief are necessary. Damper pressure ratings (both positive and negative) shall equal or exceed that of the duct in which they are to be installed.

2. Doors shall be provided with hand-operated adjustable tension catches and shall be completely gasketed around their perimeters. Provide hinged doors, or provide attachment cable or chain for each removable door. Both types may be provided on project to fit the specific requirements of each point of use.

3. Basis of Design:

   a. Access Only: Ductmate "Sandwich" or "DRI".

   b. Negative Pressure Relief: Ruskin ADHP-3.

   c. Positive Pressure Relief: Ruskin PRD18.

I. Control Grids:

1. Provide at entrances to all rectangular duct diffusers necks.

2. Constructed of aluminum, steel with corrosion resistant coating, or galvanized steel; multivaned; adjustable; properly designed to deflect, proportion and direct the air quantities indicated to the outlet without objectionable noise or pressure drop.

3. Provide with devices for adjusting and securing the position of these control grids; these devices shall allow adjustment of control grids from outside the completed ductwork without necessity for puncturing or

otherwise penetrating the ductwork and/or its vapor barrier. Provide 2” minimum operator extension when used on insulated ducts.

4. Basis of Design: Titus Model EG series.

J. Splitters:

1. Provide in low pressure ducts where indicated for adjustment of air volume to the respective branch ducts.

2. Constructed of a least the same gauge galvanized steel as the duct wherein they are used, but not less than twenty-two (22) US gauge; adequately sized to close off air to applicable branches; installed on raised insulated base when used in internally insulated ductwork. Provide 2” operator extension when used in insulated ducts.

3. Splitter blades shall be formed in two thicknesses of metal so that entering edge represents rounded (folded) nose to airflow. Blade length shall be no less than one and one half times the width of the smaller branch served, or twelve inches, whichever is larger, and rigidly attached to pivot rod and operating linkage.

4. Basis of Design for Operating Linkages: Young Regulator Co.

K. Test Openings:

1. Furnish and install gasketed test openings for test equipment (pitot tubes, etc.) on the entering and leaving sides of air handling units and other air handling equipment and heating coils. Provide with threaded caps. Provide 2” extensions where installed in insulated ducts.

2. Basis of Design:

a. Young Regulator 1100 or 1101 (for insulated ducts).

b. Young Regulator 1110 (for uninsulated ducts).

L. Duct Liner:

1. Duct liner shall be fiberglass with the surface in contact with the moving air stream protected with an acrylic coating system. The duct liner coating shall be formulated with an immobilized EPA-registered anti-microbial agent. Duct liner shall not support microbial growth. Duct liner shall pass the ASTM C 1071 and the ASTM G 21 fungi tests.

2. Thermal conductivity "k" factor at 75 degrees F of 0.25 or less.

3. Fire/smoke rating of 25/50 or less; complies with NFPA 90A.

4. Suitable for duct operating air temperatures of up to 250 degree F, and air velocities of up to 4000 FPM.

5. Thickness shall be 1" unless otherwise noted.

6. Sound Absorption Coefficient not less than 0.65 NCR for 1" thickness.

7. Basis of Design: Johns Manville “Permacote Linacoustic Standard”.

M. Fire Dampers:

1. Construction shall be of the clustered blade design, spring actuated, with integral wall sleeve, approved for horizontal or vertical installation.

2. Fusible link shall be UL listed, 165 degree F., unless noted otherwise. Damper shall be UL labeled per UL Standard 555.

3. Damper shall be style "B" with factory sleeves for use in rectangular ducts; style "C" with factory sleeves for use in round ducts.

4. Damper shall be at least as large as the net inside dimensions of the duct shown, with a static pressure loss not to exceed 0.04"wg. Submittal data shall demonstrate actual static pressure loss at scheduled CFM.

5. Basis of Design: Ruskin IBD 20, 40, or 60 Integral Sleeve Fire Damper, as required to suit thickness of partition, wall, or floor.

PART 3 - INSTALLATION

3.1 GENERAL

A. Supply Ductwork:

1. Mains: Sheet metal externally insulated, unless noted otherwise.

2. Medium Pressure Branches (to terminal units): Externally insulated sheet metal, with not more than 2 feet of insulated flexible ductwork between branch duct and air terminal.

3. Low Pressure Branches (to individual outlets): Insulated flexible ductwork (up to 6 feet); or a combination of externally insulated sheet metal and not more than 6 feet of insulated flexible ductwork.

B. Return Air Ductwork:

1. Mains: Sheet metal externally insulated; lined sheet metal where indicated.

2. Branches: Same as supply ductwork branches.

C. Outside Air Ductwork: Sheet metal externally insulated.

D. Exhaust Ductwork: Sheet metal, uninsulated and unlined, except where shown specifically lined for sound control.

E. Flexible Ductwork:

1. Medium Pressure: Flexible ducts shall be connected to medium pressure duct mains using rectangular-to-round 45 degree takeoffs. All joints in the fittings shall be sealed with duct sealant. All connections of flexible ducts to fittings, collars, etc., shall be made with stainless steel draw bands to be air tight.

2. Low Pressure: Flexible ducts shall be connected to low pressure duct mains using spin-in fittings, or rectangular-to-round 45 degree takeoffs, with quadrant dampers. All joints in the fittings shall be sealed with duct sealant. All connections of flexible ducts to fittings, collars, etc., shall be made with nylon draw bands to be air tight. Supply runouts to air distribution devices shall not exceed 10 feet in length.

F. Construct all ductwork and accessories in accordance with the SMACNA manuals.

G. Streamline all ductwork to the full extent practical and equip with adequate devices to assure proper balance and quiet distribution of indicated air quantities.

H. Prior to ductwork fabrication, verify if all ductwork as dimensioned and generally shown will satisfactorily fit allocated spaces. Take precautions to avoid space interference with beams, columns, joists, pipes, lights, conduit, other ducts, equipment, etc. Notify Engineer if any spatial conflicts exist. See paragraph entitled SUBMITTALS.

I. Carefully correlate all duct connections to air handling units, fans, and terminal units to provide proper connections, elbows and bends which will minimize noise and pressure drop. Provide five feet (5'-0") of straight main trunk duct between unit or terminal and first branch duct takeoff. If an elbow must be placed within this distance of the unit or terminal, then the first branch duct takeoff distance shall be measured through the elbow.

J. Provide all curved elbows with radius ratios of not less than 1.5 unless noted otherwise. Provide turning vanes per SMACNA Guidelines. Provide all mitered elbows with turning vanes on 2” centers where maximum design air velocity exceeds 700 FPM.

K. Coordinate any and all dimensions at interfaces of dissimilar type of ductwork and at interfaces of ductwork with equipment so that proper overlaps, interfaces, etc., of insulation and continuity of vapor barriers are maintained.

L. Install horizontal rigid ductwork as high as practical above suspended ceilings so that movable light fixtures may be relocated without interference to meet any future partition relocation requirements, and to maximize the length of vertical rectangular duct connections to rectangular diffuser necks. Such horizontal ductwork elevation is not required to be more than 24" in height from the finished ceiling to the bottom of the duct.

M. Protect all ductwork and system accessories from damage during construction until final acceptance of project.

3.2 FIELD MEASUREMENT

A. Verify routing of ductwork by field measurements prior to ductwork fabrication.

B. See Paragraph entitled SUBMITTALS regarding mechanical rooms and other obviously congested locations.

3.3 HANGERS AND SUPPORTS

A. Provide hangers and supports in accordance with the applicable SMACNA manuals.

B. Wire hangers shall not be used on insulated ducts without insulation shields.

C. Flexible ducts shall be supported from the structure above at not less than 4' intervals.

3.4 INSULATED DUCT

A. Where ducts will be insulated, make provisions for neat insulation finish around damper operating quadrants, splitter adjusting clamps, access doors, test ports, and similar devices. Provide 2" extensions for operator handles, test openings, etc.

B. A metal collar equivalent in depth to insulation thickness and of suitable size to which insulation may be finished shall be mounted on duct.

3.5 WALL AND FLOOR OPENINGS

A. All openings in non-fire-rated floor slabs and partitions through which ducts pass shall be filled tightly with mineral or glass wool batting, or sealed with UL listed foam sealant.

B. All openings in fire-rated barriers shall be protected and sealed in an UL approved manner consistent with the fire rating.

C. All openings in smoke-rated barriers shall be protected and sealed in an UL approved manner consistent with the smoke rating.

3.6 CHANGES IN SHAPE OR DIMENSION

A. Provide in accordance with the applicable SMACNA manuals.

3.7 CHANGES IN DIRECTION

A. Changes in direction shall be basically as indicated on the drawings and the following shall apply:

1. Supply duct turns shall be made with 1.5 radius elbows, or with 90o mitered elbows fitted with closely spaced turning vanes designed for maintaining a constant velocity through the elbow.

2. Return and exhaust duct turns of 90o shall be made with mitered elbows, unless 1.5 radius elbows are indicated. Provide turning vanes for mitered elbows with velocities in excess of 700 FPM, and where indicated on drawings.

3. Tees: Use requirements of duct turns.

4. Branch take-offs shall be made with extractors or splitter dampers, as indicated, in square take-offs. Branch take-offs of flexible duct runouts to diffusers shall use spin-in or rectangular-to-round fittings.

3.8 DUCT LINER

A. Install duct liner in ductwork indicated on drawings as lined ductwork.

B. Install duct liner in accordance with the SMACNA manual.

3.9 FIRE DAMPERS

A. Provide fire smoke, and ceiling fire dampers where indicated on the drawings and as required by the authority having jurisdiction.

B. Install dampers in strict accordance with the UL approved manufacturer's written instructions shipped with each damper.

3.10 DUCT SYSTEM ACCESSORIES

A. Install dust system accessories in the manner indicated on the drawings, as recommended by the manufacturer of the accessories in published written instructions, and in generally indicated in the SMACNA manual.

B. Fire dampers, smoke dampers, combination fire/smoke dampers, and ceiling fire dampers shall be installed in accordance with their UL listing requirements. Provide pressure relief type access panels for fire dampers and combination fire/smoke dampers installed in ducts with pressure ratings exceeding six inches (6") positive or negative. Negative Pressure Relief Panels shall be located on the downstream side of the dampers.

3.11 DUCT MOUNTED AIR DISTRIBUTION EQUIPMENT

A. Diffuser/register/grille connections to ductwork shall be made for a tight fit with no air leakage noise.

B. Sheet metal ductwork visible through the registers/grilles shall be painted flat black for a distance not to exceed four feet (4’-0”).

3.12 DUCT MOUNTED EQUIPMENT AND DEVICES

A. Install equipment and devices scheduled for installation on or in the duct systems, but furnished under other Sections or Divisions of the specifications.

B. Install equipment and devices in the manner indicated on the drawings, as recommended by the manufacturer of the equipment or devices in published written instructions, and as generally indicated in the SMACNA manual.

End of Section

SECTION 23 31 14 FACTORY BUILT DUCT AND FITTINGS

PART 1 - GENERAL

1.1 SCOPE

A. Provide ductwork systems constructed of factory built duct and fittings.

B. See the Section entitled DUCTWORK for general guidance and ductwork accessories.

C. The following duct systems shall may, at Contractor's option, be constructed of factory built duct and fittings:

1. Medium Pressure Supply Air Ducts.

1.2 RELATION TO OTHER WORK

A. Refer to Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Refer to the Section entitled THERMAL INSULATION.

1.3 REGULATIONS, CODED, STANDARDS AND ORDINANCES

A. Material and construction shall comply with NFPA 90A.

B. Material and construction shall comply with the Class 1 duct standards of UL 181.

C. Ductwork installation shall conform to the requirements of the SMACNA manual "HVAC Duct Construction Standards, metal and Flexible (1995)", except where specifically indicated otherwise.

1.4 MANUFACTURER

A. Products used int he design of this project are identified as "Basis of Design".

B. Equal products of other manufacturers may be submitted for approval.

PART 2 - MATERIALS AND EQUIPMENT

2.1 ROUND DOUBLE WALL DUCTWORK

A. General:

1. Duct system components shall be designed for internal duct static pressures of up to ten inches water gauge (10" w.g.), positive and negative.

2. Ductwork shall be constructed of G-90 galvanized steel in conformance with ASTM A-527.

3. Insulation shall be one inch (1") thick fiberglass with a thermal conductivity of 0.26 or less at 75oF.

4. Provide insulation thickness to meet an R-value of 6.0 if the ductwork is to be installed in interior unconditioned spaces.

5. Ductwork manufacturer shall publish literature on the performance of his products and their proper application. Such literature shall be included in the submittals.

B. Conduit:

1. Outside duct shall be of the spiral lock-seam design.

2. Inner duct shall be perforated.

C. Fittings:

1. Outside duct shall be of the welded seam design, with all welds protected against corrosion.

2. Inside duct shall be perforated or a solid liner.

D. Connections:

1. Designed for less than one-half of one percent leakage.

2. Sealing compound or material shall conform to NFPA 90A as to flame spread and smoke developed ratings.

3. Materials shall be suitable for intern al duct temperatures i the range between 40oF and 200oF.

E. Basis of Design: United Sheet Metal. Products of Semco or Monroe Metal may be submitted for approval.

2.2 FLAT-OVAL DOUBLE WALL DUCTWORK

A. General:

1. Duct system components shall be designed for internal duct static pressures of up to ten inches water gauge (10" w.g.), positive and negative.

2. Ductwork shall be constructed of G-90 galvanized steel in conformance with ASTM A-527.

3. Insulation shall be one inch (1") thick fiberglass with a thermal conductivity of 0.26 or less at 75oF.

4. Provide insulation thickness to meet an R-value of 6.0 if the ductwork is to be installed in interior unconditioned spaces.

5. Ductwork manufacturer shall publish literature on the performance of his products and their proper application. Such literature shall be included in the submittals.

B. Conduit:

1. Outside duct shall be of the spiral lock-seam design.

2. Inner duct shall be perforated.

C. Fittings:

1. Outside duct shall be of the welded seam design, with all welds protected against corrosion.

2. Inside duct shall be perforated or a solid liner.

3. Connections:

4. Designed for less than one-half of one percent leakage.

5. Sealing compound or material shall conform to NFPA 90A as to flame spread and smoke developed ratings.

6. Materials shall be suitable for internal duct temperatures in the range between 40oF and 200oF.

D. Basis of Design: United Sheet Metal. Products of Semco or Monroe metal may be submitted for approval.

2.3 HIGH PRESSURE FLEXIBLE DUCT

A. Flexible duct shall consist of a zinc coated spring steel helix permanently bonded to a full interior coated fiberglass cloth fabric liner to form the duct fore with positive interior air seal.

B. Core shall be covered with factory applied one inch, one pound per cubic foot fiberglass insulation of 0.23 thermal conductance sheathed in a seamless exterior class 1 reinforced aluminum material vapor barrier jacket with a vapor cuff on both ends.

C. Duct shall be rated for not less than 5000 fpm velocity, 12" w.g. positive internal pressure, and 4" w.g. negative internal pressure.

D. Duct shall be NFPA 90A, Class 1 (UL 181).

E. Duct shall be rated for not less than 500 fpm velocity, 12" w.g. positive internal pressure, and 4" w.g. negative internal pressure.

F. Basis of Design: Flexmaster Type 4M-insulated. Equal ducts by other manufacturers may be submitted for approval.

PART 3 - INSTALLATION

3.1 GENERAL

A. Entire system shall be of components of one system by one manufacturer, installed so as to maintain the design intentions and recommendations of the manufacturer.

B. Reinforcement shall be installed when and where recommended by the manufacturer for the application.

C. Installation details, unless specifically recommended otherwise by the manufacturer, shall be in accordance with SMACNA standards.

D. Protect all ductwork and system accessories form damage during construction until Architect's final acceptance of project.

E. Carefully correlate all duct connection to air handling units and fans actually provided on this project. Provide proper connections, elbows and bends which will minimize noise and pressure drop.

3.2 FIELD MEASUREMENT

A. Verify routing of ductwork in mechanical rooms, and other obviously congested locations, by fiend measurements prior to purchase of ductwork components.

3.3 HANGERS AND SUPPORTS

A. Provide in accordance with the manufacturers instructions and applicable SMACNA manuals, with the following exceptions:

B. None.

3.4 INSULATED DUCT

A. Where ducts will be externally insulated, make provision for neat insulation finish around damper operating quadrants, splitter adjusting clamps, access doors, and similar operating devices.

B. A metal collar equivalent in depth to insulation thickness of suitable size to which insulation may be finished shall be mounted on duct.

End of Section

SECTION 23 34 11 LIGHT DUTY IN-LINE EXHAUST FANS

PART 1 - GENERAL

1.1 SCOPE

A. Provide centrifugal light duty in-line exhaust fans of size, capacity, sound power levels, and electrical characteristics indicated on drawings.

1.2 RELATION TO OTHER WORK

A. Refer to the Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

1.3 SUBMITTALS

A. Refer to the Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Include data on: fan size, fan performance (including rating certification), fan brake horsepower, motor horsepower and electrical characteristics, sound power levels by octave band, and fan accessories.

C. Data shall take the form of engineering data sheets, clearly depicting specification compliance, and a complete schedule worked up by fan number.

1.4 CERTIFIED PERFORMANCE

A. The exhaust fans shall be AMCA certified as to both sound and performance ratings.

1.5 MANUFACTURER

A. Basis of Design: Cook “Gemini: series

B. Products of Greenheck Fan and Ventilator Corp, or Acme Engineering and Manufacturing Company, may be submitted for approval provided that they meet the requirements of these specifications and will easily fit available space.

PART 2 - PRODUCTS

2.1 FAN HOUSING

A. Fan housing and motor compartment shall be constructed of galvanized steel, lined with fiberglass insulation.

B. The fan housing shall incorporate an external flange, back draft damper, and duct collar to facilitate discharge duct connection.

C. Housing shall be finished in baked enamel.

2.2 FAN WHEEL

A. Fan wheel shall be aluminum centrifugal type and shall be statically and dynamically balanced.

B. Fan wheel shall be keyed to the shaft and locked in place using hollow set screw fasteners.

2.3 MOTOR AND STARTER

A. Motor shall be resiliently mounted on the exhaust fan assembly, removable as a unit from the housing.

B. Motors shall have built-in overload protection and permanently lubricated ball bearings.

2.4 DISCONNECT SWITCH

A. Fan shall have factory installed plug-receptacle type, or SPST switch type disconnect switch.

2.5 SOLID STATE CONTROLLER

A. Provide a solid state fan speed controller for each fan

2.6 ROOF OR WALL CAPS

A. Provide roof vent cap with base or wall cap as indicated on the drawing, plans, or schedule.

B. Roof vents and wall caps shall be heavy duty, weather proof type.

PART 3 - INSTALLATION

3.1 FAN PLACEMENT AND MOUNTING

A. Fan location shall be essentially as shown on drawings; however, actual ceiling, roof or wall openings and fan placement shall be verified using field measurements and data relating to the equipment approved for actual installation on this project.

B. Mount fan and accessories in accordance with manufacturer's instructions.

3.2 WIRING

A. Power wiring and conduit shall be performed as work of, and shall comply with, the Electrical Division of this specification.

B. Control and Interlock wiring and conduit shall be performed as work of this Division in accordance with the requirements of the Electrical Division.

C. Connections between the factory mounted and wired disconnect and the conduit system shall be made using flexible conduit properly installed so as not to transmit fan vibration or noise to the building components.

3.3 DUCT CONNECTIONS

A. Discharge ducts shall be connected to the fan housing collars using care not to damage backdraft damper.

B. Provide grounding straps across flexible connections equal to Thompson #588 braided copper bonding straps.

3.4 SOLID STATE SPEED CONTROLLER

A. Install controller in a concealed, but accessible location at or near fan for fan speed adjustment and airflow balance, unless indicated otherwise on the drawings.

3.5 TEST AND BALANCE

A. Prior to requesting final inspection the Contractor shall run all exhaust fans to insure proper operation.

B. Refer to the Section entitled TEST AND BALANCE.

End of Section

SECTION 23 36 16 VAV TERMINAL UNITS – DDC

PART 1 - GENERAL

1.1 SCOPE

A. Provide packaged variable air volume units with DDC controls where indicated on drawings.

B. Unit capacities and operating conditions shall be as scheduled on the drawings.

C. Provide full and complete coordination with Controls Subcontractor.

1.2 RELATION TO OTHER WORK

A. Refer to the Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Refer to the Section entitled BUILDING AUTOMATION SYSTEM.

C. Refer to the Section entitled DUCTWORK.

1.3 MANUFACTURER

A. Basis of Design: Titus variable volume units.

B. Equivalent products of Carrier, Envirotech, Metalaire, Reddi-Heat, Price, or Trane may be submitted for approval.

PART 2 - MATERIALS AND EQUIPMENT

2.1 VARIABLE AIR VOLUME TERMINAL UNIT

A. Casing: shall not be less than 22 gauge galvanized steel mechanically assembled and sealed to form an air tight casing, and internally insulated with 1/2" thick fiberglass meeting requirements of NFPA 90-A. All exposed surfaces and edges shall be sealed per UL 181.

B. Air Control Valve: shall be of steel or aluminum construction, with a minimum 16 gauge damper blade of 45 to 60 degree arc design. Damper blade shall be bolted or welded to a continuous 3/8" diameter shaft mounted in maintenance free bearings. Damper blade shall not deflect under pressures up to 6" w.g. Maximum air leakage rate shall not exceed 2% of air flow at 3.0" W.G.

2.2 CONTROLS

A. Terminal unit controls shall be:

1. Direct Digital Control (DDC) compatible type airflow controller provided by the Terminal Vendor including the airflow pickup ring, cross, or pitot array and interconnecting tubing.

2. Direct Digital Control (DDC) type provided by the Controls Vendor or Subcontractor, including a damper actuator to modulate the airflow in response to room temperature demand, a wall mounted space sensor, an airflow transducer, and a digital controller.

B. Terminal Unit electric heater controls shall be:

1. Direct Digital Control (DDC) type provided by the Terminal Vendor including all code required safeties, and control contactor for each stage of electric heat, which will control the operation of the electric heater in response to the room temperature demand determined by the terminal unit DDC controls space temperature sensor.

2. Direct Digital Control (DDC) type provided by the Controls Vendor for the terminal unit designed to control both the terminal unit and the electric heater.

2.3 VAV TERMINAL WITH ELECTRIC HEATER

A. Provide open coil, 80-20 Ni-Ch wire, electrical resistance heaters of the capacities and electrical characteristics scheduled on the drawings. Heater shall fully comply with the NEC requirements, and shall be UL listed.

B. Coils shall be mounted in a galvanized sheet metal frame with thermal insulation, factory wired with thermal limit switches, automatic and manual reset switches, magnetic contactors, and airflow proving switches. Contactors shall break all ungrounded legs.

C. Provide electric heater control panel, with 24 volt control power source.

PART 3 - INSTALLATION

3.1 UNIT LOCATION

A. Unit location shall essentially be as shown on the drawings; however, actual placement of the unit shall be verified using field measurements and data relating to the equipment approved for actual installation on this project.

B. Position unit so that clear access space is provided at all portions of the unit which require service.

C. Support terminal unit independently of ductwork, in accordance with SMACNA recommendations.

3.2 WIRING

A. Power wiring shall be provided as work of the Electrical Division of these specifications.

B. Control and interlock wiring and devices shall be provided as work of the Mechanical Division, in accordance with the requirements for the Electrical Division of these specifications.

3.3 DUCT CONNECTIONS

A. Provide five feet (5'-0") of straight main trunk duct between unit and first branch duct takeoff. If an elbow must be placed within this distance of the unit, then the first branch duct takeoff distance shall be measured through the elbow.

B. Supply duct connections shall be made to the units using flexible connectors and conical reducers to the unit inlets. These connectors shall be installed properly so that they are not in tension, and are aligned with their respective ducts.

3.4 CONTROLS

A. The Mechanical Contractor shall require the Controls Vendor to provide to the Terminal Unit Vendor in a timely manner the following controls for factory mounting on the terminal units.

1. Damper actuator

2. DDC Controller

B. The Mechanical Contractor shall install the terminal unit, and the connections to the duct systems. The Controls Subcontractor shall field install and connect the controls.

C. The Mechanical Contractor shall install and connect the hot water heating coil and the hot water control valve. The Controls Subcontractor shall install the valve actuator if not integral to the hot water control valve.

3.5 TEST AND BALANCE

A. Prior to test and balance work, contractor shall operate all units to verify correct operation of terminal units, accessories, and controls.

B. Contractor shall notify the Test and Balance Contractor when air distribution systems are ready for TAB work. Refer to the Section entitled TEST AND BALANCE.

End of Section

SECTION 23 36 17 FAN TERMINAL UNITS – VAV – DDC

PART 1 - GENERAL

1.1 SCOPE

A. Provide packaged variable air volume fan terminal units (parallel) with DDC controls where indicated on drawings.

B. Unit construction, capacities and operating conditions shall be as scheduled on the drawings.

C. Provide full and complete coordination with Controls Subcontractor.

1.2 RELATION TO OTHER WORK

A. Refer to the Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Refer to the Section entitled BUILDING AUTOMATION SYSTEM.

C. Refer to the Section entitled DUCTWORK.

1.3 SUBMITTALS

A. Refer to the Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Include data on: terminal construction, air valve size, performance, and noise level data (sound power levels by octave band), fan size, performance (including rating certification), fan brake horsepower (kW), motor horsepower (kW) and electrical characteristics, and fan accessories.

C. Data shall take the form of engineering data sheets, clearly depicting specification compliance, and a complete schedule worked up by terminal number.

1.4 MANUFACTURER

A. Basis of Design: Titus

B. Equivalent products of Carrier, Envirotech, Metalaire, Reddi-Heat, Price, or Trane, may be submitted for approval.

PART 2 - MATERIALS AND EQUIPMENT

2.1 FAN TERMINAL UNIT

A. Single Wall Construction: Casing shall not be less than 22 gauge galvanized steel internally insulated with 1” thick fiberglass meeting requirements of NFPA 90-A. All exposed surfaces and edges shall be sealed per UL 181.

B. Double-wall Construction: Unit shall be double-wall construction, so that no fiberglass insulation is exposed to the airstream. Casing shall not be less than 22 gauge galvanized steel internally insulated with 1” thick fiberglass meeting requirements of NFPA 90-A. All exposed surfaces and edges shall be sealed per UL 181.

C. Air Control Valve: shall be of steel or aluminum construction, with a minimum 16 gauge damper blade of 45 to 60 degree arc design; or, cast aluminum linear flow cylindrical piston type design. Damper blade shall be bolted or welded to a continuous 3/8" diameter shaft mounted in maintenance free bearings. Damper blade shall not deflect under pressures up to 6" w.g. Maximum air leakage rate of air control valve shall not exceed 2% of air flow at 3.0" W.G.

D. Fans: Forward curved blade centrifugal type fan wheel statically and dynamically balanced. Fans shall be direct drive with permanently split capacitor type internally protected motor, suitable for the power supply scheduled. Electronic speed control shall be provided. Fan assembly shall be internally isolated using rubber in shear isolators.

E. All factory wiring shall comply with NEC requirements.

F. Unit shall include a filter rack designed for one inch (1") thick filter(s), and for filter removal and replacement without tools.

2.2 ELECTRIC HEATER

A. Provide open coil, 80-20 Ni-Ch wire, electrical resistance heaters of the capacities and electrical characteristics scheduled on the drawings. Heater shall fully comply with the NEC requirements, and shall be UL listed.

B. Coils shall be mounted in a galvanized sheet metal frame with thermal insulation, factory wired with thermal limit switches, automatic and manual reset switches, magnetic contactors, and airflow proving switches. Heaters shall have full line break contactors which will break all ungrounded conductors..

C. Provide electric heater control panel, with 24 volt control power source.

2.3 CONTROLS

A. Terminal unit controls shall be:

1. Direct Digital Control (DDC) compatible type airflow controller provided by the Terminal Unit Vendor, including the airflow pickup ring, cross, or pitot array and interconnecting tubing, fan relay, and 24 volt control power transformer. Provide a permanent factory or field installed connection point on the flow sensor tubing for field monitoring and calibration of the unit.

2. Direct Digital Control (DDC) type provided by the Controls Vendor or Subcontractor, including a damper actuator to modulate the airflow in response to room temperature demand, a wall mounted space sensor, an airflow transducer, and a digital controller.

B. Electric heater controls shall be:

1. Direct Digital Control (DDC) type provided by the Terminal Vendor including all code required safeties, and control contactor for each stage of electric heat, which will control the operation of the electric heater in response to the room temperature demand determined by the terminal unit DDC controls space temperature sensor. Contactors shall be full line break type which shall break all ungrounded conductors.

2. Direct Digital Control (DDC) type provided by the Controls Vendor for the terminal unit designed to control both the terminal unit and the electric heater.

2.4 SOUND ATTENUATORS

A. Provide Discharge sound attenuators with internal acoustical splitters, when scheduled, indicated on the drawings, or required. Sound attenuator shall cause the unit discharge sound levels to equal or to be less than those scheduled.

B. Provide induction port sound baffles when scheduled, indicated on the drawings, or required, which shall cause the unit radiated sound levels to be equal to or less than those scheduled.

2.5 FILTER

A. For ducted return or return plenum systems, unit shall include a filter rack with slide track for filter removal without tools, and a one inch (1") thick disposable glass filter. Units shall not be operated without filter in place.

B. Contractor shall provide new filters in units for final inspection and acceptance.

PART 3 - INSTALLATION

3.1 UNIT LOCATION

A. Unit location shall essentially be as shown on the drawings; however, actual placement of the unit shall be verified using field measurements and data relating to the equipment approved for actual installation on this project.

B. Position unit so that clear access space is provided at all portions of the unit which require service.

C. Support units with threaded rods and rubber isolation hangers in accordance with SMACNA Guidelines.

3.2 WIRING

A. All power wiring shall be run in conduit and shall be provided as work of the Electrical Division of this specification.

B. All control and interlock wiring shall be run in conduit and shall be provided as work of the Mechanical Division, in accordance with the requirements of the Electrical Division of this specification.

3.3 DUCT CONNECTIONS

A. Provide five feet (5'-0") of straight main trunk duct between unit and first branch duct takeoff. If an elbow must be placed within this distance of the unit, then the first branch duct takeoff distance shall be measured through the elbow.

B. Supply duct connections shall be made to the units using flexible connectors and conical reducers to the unit inlets. These connectors shall be installed properly so that they are not in tension, and are aligned with their respective ducts.

3.4 CONTROLS

A. The Mechanical Contractor shall require the Controls Vendor to provide to the Terminal Unit Vendor in a timely manner the following controls for factory mounting on the terminal units.

1. Damper actuator

2. DDC Controller

B. The Mechanical Contractor shall install the fan terminal unit, and the connections to the duct systems. The Electrical Contractor shall provide and connect the power wiring. The Controls Subcontractor shall field install and connect the controls.

C. The Mechanical Contractor shall, where applicable, install and connect the hot water heating coil and the hot water control valve. The Controls Subcontractor shall install the valve actuator if not integral to the hot water control valve.

3.5 OPERATION

A. Units shall not be operated, except for testing purposes, until completely installed and connected in the system. Units shall not be operated without filter in place.

B. Provide one inch (1") thick, 30% efficient, pleated type disposable filters, prior to unit operation. Replace these filters with new filters for final inspection and acceptance.

C. Where fan terminal units can not provide scheduled air flows because of limitations of the variable speed motor controller, provide discharge baffle in unit, or adjustable damper in discharge duct, to provide additional static pressure for adjusting airflow to scheduled air quantities.

3.6 TEST AND BALANCE

A. Prior to test and balance work, contractor shall start and run all units to verify correct operation.

B. Refer to the Section entitled TEST AND BALANCE.

End of Section

SECTION 23 37 00 AIR DISTRIBUTION EQUIPMENT

PART 1 - GENERAL

1.1 SCOPE

A. Provide all air distribution devices as indicated on the drawings and as specified herein for a complete and operable system free from drafts and excessive noise.

B. The air distribution devices and sound attenuation measures indicated on the drawings and specified herein have been selected to maintain a sound power level within the occupied space of not more than NC 30 for Conference Rooms, NC 40 for corridors and lounges, and NC 35 for all other spaces. The Contractor shall coordinate air distribution devices, sound attenuation measures, and equipment actually provided to insure that these design goals are not exceeded by the system as actually installed.

1.2 RELATION TO OTHER WORK

A. Coordinate the work of the ceiling, drywall and plastering trades as required to insure an orderly progression of work and a first class finished system with respect to placement, alignment, finish and general fit.

B. Refer to the Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

C. Refer to the Section entitled DUCTWORK.

D. Refer to the Section entitled INSULATION.

1.3 SUBMITTALS

A. Refer to the requirements of COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Include complete data on proposed sizes, noise levels, pressure drops, air flow quantities, throw, finishes, and accessory devices including mounting frames completely dimensioned.

C. The data shall be in the form of engineering data sheets and a complete schedule worked up by room numbers.

1.4 MANUFACTURER

A. Basis of Design: Price

B. Products of Titus and Metalaire, meeting these specifications may be submitted for approval.

PART 2 - PRODUCTS

2.1 MOUNTING SCREWS

A. Where grilles, diffusers, or registers are specified which require mounting screws visible from the face of the device, these screws shall be furnished with the air distribution equipment and shall be finished at the factory to match the finish on the grille, diffuser, or register in which they are to be used.

PART 3 - INSTALLATION

3.1 RECTANGULAR CEILING DIFFUSERS

A. Where diffusers are the lay-in type, they shall be supported by the inverted T-bar suspension system but all ducts connected thereto shall be supported independently of the ceiling as specified under Section entitled DUCTWORK. Surface mounted diffusers shall be supported by the duct runouts or drops where sheet metal ducts are indicated and by separate hangers where flex runouts are indicated. All rectangular ceiling diffusers shall be installed with their lines parallel and perpendicular to the building lines and properly aligned with the ceiling.

3.2 SIDEWALL GRILLES AND REGISTERS

A. Mount securely to the duct system flanges using finish screws and in accordance with accepted good practice.

3.3 EXHAUST AND RETURN CEILING REGISTERS AND GRILLES

A. Use finished screws provided and secure to duct and finished ceiling (or finished ceiling for non-ducted returns) in accordance with the manufacturer's instructions.

B. Where required to provide adequate support for non-ducted registers or grilles, provide appropriate mounting frame for incorporation into the ceiling system.

3.4 EXHAUST AND RETURN WALL MOUNTED REGISTERS AND GRILLES

A. Mount securely to the duct system (or to the wall in non-ducted applications) using finish screws and in accordance with accepted good practice.

B. Use tamperproof screws where indicated on the drawings.

3.5 DUCTWORK

A. Diffuser/register/grille connections to ductwork shall be made for a tight fit with no air leakage noise.

B. Sheet metal ductwork visible through the registers/grilles shall be painted flat black for a distance not to exceed four feet (4’-0”).

3.6 PROTECTION OF WORK UNTIL FINAL ACCEPTANCE

A. Coordinate the installation of the air distribution equipment with related work and finishing of adjacent surfaces to prevent damage to the devices or adjacent finishes.

B. Protect the finish of all air distribution equipment until final acceptance.

C. Replace or repair to the Engineer's satisfaction any damaged equipment.

End of Section

SECTION 23 73 23 CUSTOM AIR HANDLING UNITS

PART 1 - GENERAL

1.1 SCOPE

A. Provide custom air handling units of the types and capacities indicated on the drawings.

B. These custom Air handling units shall be designed for disassembly and transport through restrictive spaces in order to install them in their design locations.

1.2 RELATION TO OTHER WORK

A. Refer to Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Contractor shall coordinate shop drawings; equipment ordering, delivery and placement, structural framing; utility connections; and the work of all trades to insure an orderly and timely progress of the work.

C. Contractor shall carefully coordinate the disassembly and assembly of the unit necessary for transport of the unit to its design installation location.

1.3 SHOP DRAWINGS

A. Refer to Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK.

B. Include complete data on: Performance at indicated operating conditions; Fan curves with plotted operating point(s); Sound data by octave band; Unit dimensions and dimensions of various unit components (disassembled); Equipment weights; Accessory items, including thermostats and like items; Manufacturer's published installation instructions; Power and control wiring (both factory and field); Operating and safety controls; Utility connections; Minimum operating and service clearances; and installation instructions.

C. Submit assembly-type drawings showing unit and component dimensions; weight loadings; required clearances for transportation, installation, operation, and service; construction details; and field utility connection details.

1.4 OPERATION AND MAINTENANCE INSTRUCTIONS

A. Refer to the Section entitled OPERATION AND MAINTENANCE MANUALS.

B. Provide wiring diagrams (both factory and field), maintenance data and requirements, and a complete set of the approved submittals.

1.5 MANUFACTURERS

A. The units used as a Basis of Design are products of Temtrol as indicated on the drawings.

B. Equivalent products of other manufacturers may be submitted for approval provided they meet the requirements of these specifications, and will easily fit in the available spaces.

1.6 REGULATIONS, CODES, STANDARDS, AND ORDINANCES

A. Unit performance shall be certified in accordance with ARI Standard 430 for Central Station Units.

B. Coil performance shall be certified in accordance with ARI Standard 410.

C. Unit sound data shall be certified in accordance with AMCA 300.

D. All insulation and insulation adhesives shall comply with the requirements of NFPA 90A.

E. Electrical components shall be listed and labeled by UL and comply with NEMA Standards.

PART 2 - PRODUCTS

2.1 GENERAL

A. Units shall be of modular design, and factory assembled to the appropriate degree necessary for this project. Units exceeding standard truck shipping sizes shall be shipped in the fewest number of sections required to meet the shipping requirements. Sections may be required to be shipped “knocked down” for transport of the components within the restrictive spaces of the project facility, and field-assembled by the Contractor at the design location.

B. Unit performance shall meet or exceed that shown on the Air Handling Unit schedule.

C. Units shall be of draw-through design, unless indicated otherwise on the drawings. All coil connections, drain connection(s), electrical connections, and service access doors and service space requirements shall be coordinated with the field locations of these utilities.

2.2 BASE AND FRAME

A. The entire unit shall be mounted on a base frame formed of minimum 12 gauge galvanized steel. Welded or bolted frame construction is acceptable. All major components shall be supported by the base frame. “Knocked down” units shall be shipped with sufficient gaskets, bolts, and other hardware necessary for reassembly in the field by the Contractor.

B. Framing material shall be fabricated of galvanized steel. The floor shall be a “double-bottom” insulated floor constructed of not less than 16 gauge stainless steel designed for foot traffic inside the unit.

2.3 CASINGS

A. Unit shall be constructed of minimum 18 gauge corrosion-resistant steel with zinc-rich prime coat and epoxy enamel finish, or minimum of G90 galvanized exterior finish. The casing shall be structurally rigid with adequate internal bracing to prevent distortion and maintain proper component alignment.

B. Casing shall be of double wall construction of the no-through-metal design. The inner liner shall be a minimum of 20 gauge solid galvanized steel (except for the supply fan section that will have a perforated inner wall for acoustical performance. Insulation behind the perforated inner liner shall be protected with a Mylar or Tedlar film. The double wall panels shall be insulated with not less than two inches (2") thick glass fiber insulation with a minimum density of 1-1/2 pounds. The insulation shall have an effective thermal conductivity © of o.24 Btu per inch per sq. ft. per degree F, and a Noise Reduction Coefficient (NRC) of 0.70 per inch of thickness. Insulation shall be UL 723 fire and smoke rated. The outer casing shall be constructed of 16 gauge G-90 galvanized steel, with insulating thermal breaks to prevent continuous metal-to-metal conduction between the inner and outer casing surfaces.

C. Access shall be by means of hinged access doors, with extruded aluminum door frame and fully gasketed edges. Access size and location shall be sufficient to provide easy access to all controls, fans, drive components, coils, filters, and other components requiring access. Design shall allow full access to all internal surfaces in contact with the treated air stream for periodic cleaning of microbial growth. Removal of panels shall not affect the structural integrity of the unit. The entire casing assembly shall be capable of withstanding a positive internal pressure of 8" wg., and a negative internal pressure of 4" wg., and shall be rated Class C per AMCA Standard 1401. Total leakage of the assembled unit shall not exceed one percent (1 %) of the rated air flow at the design maximum air pressure.

D. Casings large enough for personnel entry inside the unit shall be equipped with marine lights and door handles which will open from the inside. Provide personnel protective guards on moving machinery in accordance with OSHA requirements. Doors shall be a minimum of twenty-four inches (24”) wide, and at least five feet (5’-0”) high (or the maximum height allowed by unit height if less than five feet).

E. Provide duct connection flanges at all air intake and discharge location on the unit.

F. When scheduled, provide a capped wash-down drain in each section of the unit.

2.4 DRAIN PANS

A. Unit shall have a double-wall insulated drain pan which shall extend under the entire coil section on blow-through equipment, and under the entire fan and coil sections on draw-through equipment. Drain pan design shall allow condensate trapping outside of the unit, with no condensate standing in the drain pan.

B. Drain pan shall have a minimum of 16 gauge Type 304 stainless steel wet-side pan sloped in two planes for positive condensate drainage from pan, leaving no standing water within the unit. Pan shall be insulated with two inches of insulation. Non-wet liner may be stainless or galvanized steel. The pan shall have a minimum depth of four inches (4").

C. Units with stacked coils shall have an intermediate drain pan for each coil, with drop tubes to carry condensate down to the main drain pan. Tubes and pans shall be designed for the maximum amount of expected condensate when operating at the scheduled conditions. Pans and tubes shall be constructed of Type #304 stainless steel as a minimum.

2.5 SUPPLY FAN SECTIONS

A. Supply fans shall be AF design, rated in accordance with AMCA 210 for performance and AMCA 300 for sound. Fan wheels shall be of the double width, double inlet (DWDI) type, Class III, with airfoil blades, statically and dynamically balanced, and shall not pass through the first critical speed at the scheduled operating conditions. Fan wheels shall be fabricated of heavy gauge steel, and shall be keyed to their respective fan shafts.

B. The fan shaft shall be turned, ground, and polished solid steel rated at maximum rpm below critical speed. Provide self-aligning, re-greasable ball bearings. Bearings shall be rated for an average life (L50) of at least 200,000 hours.

C. Mount fans on minimum 16 gauge galvanized steel isolation base. Mount motors and drives on the same base, and isolate motor and drive base from unit structural base with 1" open springs vibration isolators. Provide flexible duct connections between fan outlets and unit casings.

1. Where noted provide variable inlet vanes for the fans. Inlet vane assemblies shall be constructed of heavy gauge galvanized steel designed to fit the fan inlet cone. Inlet vanes shall operate from a single shaft and controller for each fan.

D. Motors, Drives, and Motor Starters

1. Motors: Refer to the requirements of the Section entitled COMMON REQUIREMENTS FOR MECHANICAL WORK, and to the Electrical Specifications. Motors shall be TEFC type.

2. Drives: V-belt drives shall be selected at 150% of motor nameplate horsepower. Variable pitch drive sheaves shall be furnished on motors up

to 10 HP and fixed pitch on 15 HP motors and larger. Fixed pitch sheaves shall be provided on all fans in excess of 2,000 rpm.

a. For units with variable pitch sheaves, provide fixed pitch sheaves to be installed after test and balance is complete.

b. Where noted, the fan(s) shall be controlled by Variable Speed Drive(s). Refer to the Section entitled VARIABLE SPEED DRIVES.

3. Motor Starters: Provide H-O-A switches on motor starters. Refer to the Electrical Specifications for additional requirements.

E. Maintenance Equipment: When scheduled, provide in the fan section an overhead trolley rail system to facilitate the removal of the fan and/or the fan motor.

2.6 RETURN AIR FAN SECTIONS

A. Return air fan sections shall be the same as the supply air fan sections, except as noted in this paragraph and as scheduled on the drawings.

2.7 CHILLED WATER COOLING COIL SECTIONS

A. Coils shall be of the seamless copper tube type with aluminum heat transfer fins mechanically bonded thereto. Coil headers shall be seamless copper with die formed tube holes. Maximum fin spacing shall be 12 fins per inch unless otherwise scheduled. Coils shall be suitable for 250 psi working pressure and tested at not less than 300 psig and proved tight. Coil performance shall be certified in accordance with ARI Standard 410.

B. Each cooling coil creating condensation shall have a coil air face velocity not exceeding the scheduled face velocity, or 500 feet per minute, whichever is less.

C. Coil tracks and supports shall be constructed of type 304 stainless steel. Coils shall be removable through the unit's access doors or panels. Provide service access space for coil removal and replacement.

D. Provide multiple coil sections split horizontally and/or vertically as appropriate to unit casing size. Safe off all spaces between coils to prevent air bypassing the coils. Provide insulated intermediate stainless steel drain pans beneath each section of cooling coil above the bottom section. Intermediate drain pans shall extend a minimum of eight inches (8”) past the downstream face of the coil. Provide a drain tube from each intermediate drain pan down to down to the base drain pan.

E. Water coils shall be circuited for counter flow of air and water, and to provide free and complete draining and venting of the coil in place. Provide drain and vent connections, extended to an accessible location for servicing.

2.8 MEDIUM EFFICIENCY FILTER SECTIONS

A. The filter section assemblies shall incorporate filter racks designed for 12" deep medium efficiency cartridge filter units, with pre-filter racks designed for throwaway type filters of two inches thickness. Filter racks shall be design for face access.

B. Prefilters shall have non-organic long fiber mineral glass type media with viscous coating, in disposable pleated type construction, with MERV 7 minimum efficiency, and shall be UL Class 2.

C. Cartridge filter units shall average efficiency of MERV 13 and shall not have face velocities exceeding 350 feet per minute.

D. Provide pre-filters in all air handling units before operation. Units may be operated during construction with pre-filters only. Provide new prefilters whenever old filters become fully loaded. Provide and install new pre-filters, and cartridge filters, in unit at time of formal Test and Balance.

E. Provide each filter bank with a magnehelic gauge set, complete with static pressure tips, aluminum or copper tubing, and vent valves. Basis of design is Dwyer Model 2003.

2.9 ACCESS SECTIONS

A. Provide access sections where indicated on the drawings, in the Air Handling Unit schedule, or as required for proper service access.

B. Access section construction shall be same as the remainder of the air handling unit in which it is installed.

PART 3 - INSTALLATION

3.1 PLACEMENT AND MOUNTING

A. Unit locations shall be essentially as shown on drawings; however, actual placement of the equipment shall be verified using field measurements, and data relating to the units approved for actual installation on this project.

B. Fabricate and ship units “knocked down” or in sections as required to transport and install units at the jobsite. Contractor shall visit the site to determine the degree of “knockdown” necessary to transport and install the units without affecting existing building structure, doors, walls, or other openings in the building. Coordination of the existing opening sizes and the extent of “knockdown” shall be the Contractor’s responsibility.

3.2 WIRING

A. All power wiring shall be run in conduit and shall be provided as work of the Electrical Division of this specification.

B. All control and interlock wiring shall be run in conduit and shall be provided as work of the Mechanical Division, in accordance with the requirements of the Electrical Division of this specification.

3.3 DUCT CONNECTIONS

A. Supply and return ducts shall be connected to their respective unit duct collars using flexible connectors. These connectors shall be properly installed so that they are not in tension and are aligned with their respective ducts.

3.4 TESTING AND BALANCE

A. Refer to Section entitled TEST AND BALANCE.

3.5 FACTORY SERVICE AND TRAINING

A. Factory Service: Contractor shall include in his price the cost of a factory trained service engineer for not less than forty (40) hours for coordination of the installation, start-up and testing of the units.

B. Factory Training: Contractor shall include in his price the cost of four (4) hours of on-site instruction by an authorized representative of the manufacturer of the equipment. This instruction shall be given to the Owner's designated service personnel in two classes (of two hours each) at different times to allow for personnel attendance from different shifts. Times and locations shall be coordinated with the Owner’s representative.

C. Factory Training Statement: Obtain written statement signed by Owner's Representative that Owner's personnel have received the required instruction, and have received the equipment operating instructions in Operation and Maintenance Manuals.

End of Section

Project Manual

EXCERPT INCL:
DIVISION 26 ELECTRICAL
DIVISION 27 COMMUNICATIONS
DIVISION 28 ELECTRICAL SAFETY & SECURITY

BID NUMBER – BID-SJR-06-2018

Renovation with Addition To Building V, St. Augustine Campus

2990 College Drive
St. Augustine, Florida 32084

TO BE CONSTRUCTED FOR:

ST. JOHNS RIVER STATE COLLEGE

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SECTION 26 05 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

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

B. See other Division16 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.2 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. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

D. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

E. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

F. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use CSI Form 13.1A.

2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

   a. Statement indicating why specified material or product cannot be provided.
   b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
   c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
   d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
   e. Samples, where applicable or requested.
   f. List of similar installations for completed projects with project names and addresses and names and addresses of engineers and owners.
   g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
   h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
   i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time.
   j. Cost information, including a proposal of change, if any, in the Contract Sum.
   k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
   l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Engineer's Action: If necessary, Engineer will request additional information or documentation for evaluation within one week of receipt of a request for substitution. Engineer will notify Contractor of acceptance or rejection of proposed substitution within **15** days of receipt of request, or **7** days of receipt of additional information or documentation, whichever is later.

   a. Form of Acceptance: Written Notification.
   b. Use product specified if Engineer cannot make a decision on use of a proposed substitution within time allocated.

1.3 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

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 weathertight 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.

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Engineer will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Engineer's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.

B. Product Selection Procedures: Procedures for product selection include the following:

1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer, provide the product named.

   a. Substitutions may be considered.

2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product by the manufacturer or from the source named that complies with requirements.

   a. Substitutions may be considered.

3. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.

a. Substitutions may be considered.

4. Manufacturers: Where Specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.

   a. Substitutions may be considered.

5. Available Products: Where Specification paragraphs or subparagraphs titled "Available Products" introduce a list of names of both products and manufacturers, provide one of the products listed or another product that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
6. Available Manufacturers: Where Specification paragraphs or subparagraphs titled "Available Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed or another manufacturer that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
7. Basis-of-Design Products: Where Specification paragraphs or subparagraphs titled "Basis-of-Design Product" are included and also introduce or refer to a list of manufacturers' names, provide either the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

   a. Substitutions **may** be considered.

8. Visual Matching Specification: Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and matches Engineer's sample. Engineer's decision will be final on whether a proposed product matches satisfactorily.

   a. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents on "substitutions" for selection of a matching product.

9. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.

   a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Engineer will select color, pattern, or texture from manufacturer's product line that does not include premium items.
   b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Engineer will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

A. Timing: Engineer will consider requests for substitution if received within **60** days after **commencement of the Work**. Requests received after that time may be considered or rejected at discretion of Engineer.

B. Conditions: Engineer will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Engineer will return requests without action, except to record noncompliance with these requirements:

1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Engineer for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
2. Requested substitution does not require extensive revisions to the Contract Documents.
3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.

2.3 COMPARABLE PRODUCTS

A. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of Engineers and owners, if requested.
5. Samples, if requested.

END OF SECTION

SECTION 26 05 10

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Electrical equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Sleeve seals.
4. Common electrical installation requirements.
5. Additional work.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

A. Test Equipment Suitability and Calibration: Comply with NETA ATS, "Suitability of Test Equipment" and "Test Instrument Calibration."

1.4 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed.

D. Coordinate electrical testing of electrical, mechanical, and architectural items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

C. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 7 Section "Through-Penetration Firestop Systems."

2.2 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
2. Pressure Plates: Plastic. Include two for each sealing element.
3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 ADDITIONAL WORK

B. Contractor shall include as part of the base bid allowance for providing additional electrical work as may be required on this project and as itemized below:

(1) Exit signs (Type “E”).

(2) Type “A1” fixtures.

(2) Type “A2” fixtures.

(2) Type “B” fixtures.

(2) Type “D” fixtures.

(1) Type “R” fixture.

(4) Duplex receptacles.

(4) Data outlets with (2) jacks/cables each.

(2) Single pole toggle switches.

(2) Low voltage dimmers or switches.

(2) Ceiling mounted occupancy sensors.

(1) Fire alarm pull station.

(2) Fire alarm/speaker/light.

C. Allowance shall include all cost for required wires and conduits, fittings, support, connections, boxes, accessories, all costs for purchase, transportation, and installation of additional electrical work. General contractors insurance, bond, overhead and profit shall be included in the base bid. Location of lighting fixtures, and devices as directed by architect/engineer.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

D. Cut sleeves to length for mounting flush with both surfaces of walls.

E. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.

F. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.

G. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.

H. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.

I. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials.

J. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

K. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

L. Underground, Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.3 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

END OF SECTION

SECTION 26 05 19

CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.2 SUBMITTALS

A. Field quality-control test reports.

1.3 QUALITY ASSURANCE

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

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

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

2.2 CONDUCTORS AND CABLES

A. Available Manufacturers:
1. American Insulated Wire Corp.; a Leviton Company.
2. General Cable Corporation.
3. Senator Wire & Cable Company.
4. Southwire Company.

B. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.

C. Conductor Material: Copper complying with NEMA WC 5 or 7; solid conductor for No. 10 AWG and smaller, stranded for No. 8 AWG and larger.

D. Conductor Insulation Types: Type THHN-THWN and SO complying with NEMA WC 5 or 7.

2.3 CONNECTORS AND SPLICES

A. Available Manufacturers:

1. AFC Cable Systems, Inc.
2. AMP Incorporated/Tyco International.
3. Hubbell/Anderson.
4. O-Z/Gedney; EGS Electrical Group LLC.
5. 3M Company; Electrical Products Division.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR AND INSULATION APPLICATIONS

A. Service Entrance: Type THHN-THWN, single conductors in raceway.

B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspaces: Type THHN-THWN, single conductors in raceway.

E. Exposed Branch Circuits, including in Crawlspaces: Type THHN-THWN, single conductors in raceway.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

G. Branch Circuits Concealed in Concrete and below Slabs-on-Grade: Type THHN-THWN, single conductors in raceway.

H. Class 1 Control Circuits: Type THHN-THWN, in raceway.

I. Class 2 Control Circuits: Type THHN-THWN, in raceway.

3.2 INSTALLATION

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

E. Support cables according to Division 16 Section "Basic Electrical Materials and Methods."

F. Seal around cables penetrating fire-rated elements.

G. Identify and color-code conductors and cables according to Division 16 Section "Electrical Identification."

H. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

I. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches (300 mm) of slack.

3.3 FIELD QUALITY CONTROL

A. Testing: Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes methods and materials for grounding systems and equipment.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Field quality-control test reports.

1.3 QUALITY ASSURANCE

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

B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.

5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.2 CONNECTORS

A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.

1. Pipe Connectors: Clamp type, sized for pipe.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel, sectional type; 3/4 inch by10 feet (19 mm by 3 m) in diameter.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.

B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum. Bury at least 24 inches (600 mm) below grade.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Single-phase motor and appliance branch circuits.
5. Three-phase motor and appliance branch circuits.
6. Flexible raceway runs.
7. Armored and metal-clad cable runs.
8. Computer and Rack-Mounted Electronic Equipment Circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.

B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

C. Water Heater: Install a separate insulated equipment grounding conductor to each electric water heater. Bond conductor to heater units, piping, connected equipment, and components.

D. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.

E. Signal and Communication Equipment: For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG

minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.

1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch (6-by-50-by-300-mm) grounding bus.
2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

F. Metal Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade, unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating, if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.

D. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

3.4 FIELD QUALITY CONTROL

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

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells.

    a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method according to IEEE 81.

B. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity 500 kVA and Less: 2 ohms.
2. Power and Lighting Equipment or System with Capacity 500 to 1000 kVA: 2 ohms.

3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 2 ohms.
4. Power Distribution Units or Panelboards Serving Electronic Equipment: 2 ohm(s).

C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION

SECTION 26 05 29

ELECTRICAL SUPPORTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

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

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed under this Project, with a minimum structural safety factor of five times the applied force.

B. Steel Slotted Support Systems: Comply with MFMA-3, factory-fabricated components for field assembly, and provide finish suitable for the environment in which installed.

1. Available Manufacturers:

a. Cooper B-Line; a division of Cooper Industries.
b. ERICO International Corporation.
c. Allied Support Systems; Power-Strut Unit.
d. GS Metals Corp.
e. Michigan Hanger Co., Inc.; O-Strut Div.
f. National Pipe Hanger Corp.
g. Thomas & Betts Corporation.
h. Unistrut; Tyco International, Ltd.
i. Wesanco, Inc.

2. Channel Dimensions: Selected for structural loading.

C. Raceway and Cable Supports: As described in NECA 1.

D. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

   a. Available Manufacturers:

      1) Cooper B-Line; a division of Cooper Industries.
      2) Empire Tool and Manufacturing Co., Inc.
      3) Hilti, Inc.
      4) ITW Construction Products.
      5) MKT Fastening, LLC.

2. Concrete Inserts: Steel or malleable-iron slotted-support-system units similar to MSS Type 18; complying with MFMA-3 or MSS SP-58.
3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
4. Through Bolts: Structural type, hex head, high strength. Comply with ASTM A 325.
5. Toggle Bolts: All-steel springhead type.
6. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 for application of hangers and supports for electrical equipment and systems, unless requirements in this Section or applicable Code are stricter.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 for installation requirements, except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods, unless otherwise indicated by Code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
6. To Light Steel: Sheet metal screws.
7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount on slotted-channel racks attached to substrate.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

B. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions.

B. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so expansion anchors will be a minimum of 10 bolt diameters from edge of the base.

1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around full perimeter of the base.
2. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
3. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.
5. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
6. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete.

C. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, upper truss chords of bar joists, or at concrete member.

END OF SECTION

SECTION 26 05 33

RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

B. See Division 16 Section "Basic Electrical Materials and Methods" for supports, anchors, and identification products.

C. See Division 16 Section "Seismic Controls for Electrical Work" for bracing of raceways, boxes, enclosures, and cabinets.

D. See Division 16 Section "Wiring Devices" for devices installed in boxes and for floor-box service fittings.

1.2 SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets indicated.

B. Shop Drawings: Show fabrication and installation details of components for raceways, fittings, boxes, enclosures, and cabinets.

1.3 QUALITY ASSURANCE

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

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

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

2.2 METAL CONDUIT AND TUBING

A. Available Manufacturers:

1. AFC Cable Systems, Inc.
2. Alflex Inc.
3. Anamet Electrical, Inc.; Anaconda Metal Hose.
4. Electri-Flex Co.
5. Grinnell Co./Tyco International; Allied Tube and Conduit Div.
6. LTV Steel Tubular Products Company.
7. Manhattan/CDT/Cole-Flex.
8. O-Z Gedney; Unit of General Signal.
9. Wheatland Tube Co.

B. Rigid Steel Conduit: ANSI C80.1.

C. Aluminum Rigid Conduit: ANSI C80.5.

D. IMC: ANSI C80.6.

E. EMT and Fittings: ANSI C80.3.

1. Fittings: Compression type.

F. FMC: Aluminum.

G. LFMC: Flexible steel conduit with PVC jacket.

H. Fittings: NEMA FB 1; compatible with conduit and tubing materials.

2.3 NONMETALLIC CONDUIT AND TUBING

A. Available Manufacturers:

1. American International.
2. Anamet Electrical, Inc.; Anaconda Metal Hose.
3. Arnco Corp.
4. Cantex Inc.
5. Certainteed Corp.; Pipe & Plastics Group.
6. Condux International.
7. ElecSYS, Inc.
8. Electri-Flex Co.
9. Lamson & Sessions; Carlon Electrical Products.
10. Manhattan/CDT/Cole-Flex.
11. RACO; Division of Hubbell, Inc.
12. Spiralduct, Inc./AFC Cable Systems, Inc.
13. Thomas & Betts Corporation.

B. ENT: NEMA TC 13.

C. RNC: NEMA TC 2, Schedule 40 and Schedule 80 PVC.

D. ENT and RNC Fittings: NEMA TC 3; match to conduit or tubing type and material.

E. LFNC: UL 1660.

2.4 METAL WIREWAYS

A. Available Manufacturers:

1. Hoffman.
2. Square D.

B. Material and Construction: Sheet metal sized and shaped as indicated, NEMA 1.

C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.

E. Wireway Covers: Hinged type.

F. Finish: Manufacturer's standard enamel finish.

2.5 BOXES, ENCLOSURES, AND CABINETS

A. Available Manufacturers:

1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
2. Emerson/General Signal; Appleton Electric Company.
3. Erickson Electrical Equipment Co.
4. Hoffman.
5. Hubbell, Inc.; Killark Electric Manufacturing Co.
6. O-Z/Gedney; Unit of General Signal.
7. RACO; Division of Hubbell, Inc.
8. Robroy Industries, Inc.; Enclosure Division.
9. Scott Fetzer Co.; Adalet-PLM Division.
10. Spring City Electrical Manufacturing Co.
11. Thomas & Betts Corporation.
12. Walker Systems, Inc.; Wiremold Company (The).
13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.

B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.

D. Nonmetallic Outlet and Device Boxes: NEMA OS 2.

E. Floor Boxes: Cast metal, fully adjustable, rectangular.

F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

G. Cast-Metal Pull and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.

H. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.

I. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage and include accessory feet where required for freestanding equipment.

2.6 FACTORY FINISHES

A. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard paint applied to factory-assembled surface raceways, enclosures, and cabinets before shipping.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors:

1. Exposed: Rigid steel or IMC.
2. Concealed: Rigid steel or IMC.
3. Underground, Single Run: RNC.
4. Underground, Grouped: RNC.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
6. Boxes and Enclosures: NEMA 250, Type 3R.

B. Indoors:

1. Exposed: EMT.
2. Concealed: EMT.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except use LFMC in damp or wet locations.
4. Damp or Wet Locations: Rigid steel conduit.
5. Boxes and Enclosures: NEMA 250, Type 1, except as follows:

   a. Damp or Wet Locations: NEMA 250, Type 4, stainless steel.

C. Minimum Raceway Size: 1/2-inch trade size (DN 16).

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits.
3. EMT: Steel compression fittings.

E. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.

F. Do not install aluminum conduits embedded in or in contact with concrete.

3.2 INSTALLATION

A. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

B. Complete raceway installation before starting conductor installation.

C. Support raceways as specified in Division 16 Section "Basic Electrical Materials and Methods."

D. Install temporary closures to prevent foreign matter from entering raceways.

E. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above finished slab.

F. Make bends and offsets so ID is not reduced. Keep legs of bends in same plane and keep straight legs of offsets parallel, unless otherwise indicated.

G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.

1. Install concealed raceways with a minimum of bends in shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.

H. Raceways Embedded in Slabs: Install in middle 1/3 of slab thickness where practical and leave at least 2 inches (50 mm) of concrete cover.

1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
2. Space raceways laterally to prevent voids in concrete.
3. Run conduit larger than 1-inch trade size (DN 27) parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
4. Change from nonmetallic tubing to Schedule 80 nonmetallic conduit, rigid steel conduit, or IMC before rising above floor.

I. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.

1. Run parallel or banked raceways together on common supports.
2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.

J. Join raceways with fittings designed and approved for that purpose and make joints tight.

1. Use insulating bushings to protect conductors.

K. Tighten set screws of threadless fittings with suitable tools.

L. Terminations:

1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used,

align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.

M. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire.

N. Telephone and Signal System Raceways, 2-Inch Trade Size (DN 53) and Smaller: In addition to above requirements, install raceways in maximum lengths of 150 feet (45 m) and with a maximum of two 90-deg ree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.

O. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where otherwise required by NFPA 70.

P. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches (150 mm) above the floor. Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.

Q. Flexible Connections: Use maximum of 72 inches (1830 mm) of flexible conduit for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections.

R. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.

S. Set floor boxes level and flush with finished floor surface.

T. Set floor boxes level. Trim after installation to fit flush with finished floor surface.

U. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

3.3 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

SECTION 26 05 53

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Identification for conductors and communication and control cable.
2. Warning labels and signs.
3. Equipment identification labels.

1.2 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

1.4 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

PART 2 - PRODUCTS

2.1 CONDUCTOR AND COMMUNICATION- AND CONTROL-CABLE IDENTIFICATION MATERIALS

A. Marker Tape: Vinyl or vinyl -cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.2 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment, unless otherwise indicated.

C. Baked-Enamel Warning Signs: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 7 by 10 inches (180 by 250 mm).

D. Metal-Backed, Butyrate Warning Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 10 by 14 inches (250 by 360 mm).

E. Fasteners for Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

F. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 mm)."

2.3 EQUIPMENT IDENTIFICATION LABELS

A. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

PART 3 - EXECUTION

3.1 APPLICATION

A. Auxiliary Electrical Systems Conductor and Cable Identification: Use marker tape to identify field-installed alarm, control, signal, sound, intercommunications, voice, and data wiring connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and cable pull points. Identify by system and circuit designation.

2. Use system of designations that is uniform and consistent with system used by manufacturer for factory-installed connections.

B. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Comply with 29 CFR 1910.145 and apply self-adhesive warning labels. Identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.

1. Equipment with Multiple Power or Control Sources: Apply to door or cover of equipment including, but not limited to, the following:

a. Power transfer switches.
b. Controls with external control power connections.

2. Equipment Requiring Workspace Clearance According to NFPA 70: Unless otherwise indicated, apply to door or cover of equipment but not on flush panelboards and similar equipment in finished spaces.

C. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where 2 lines of text are required, use labels 2 inches (50 mm) high.
b. Outdoor Equipment: Engraved, laminated acrylic or melamine label, drilled for screw attachment.
c. Elevated Components: Increase sizes of labels and legend to those appropriate for viewing from the floor.

2. Equipment to Be Labeled:

a. Panelboards, electrical cabinets, and enclosures.
b. Electrical switchgear and switchboards.
c. Transformers.
d. Disconnect switches.
e. Enclosed circuit breakers.
f. Motor starters.
g. Push-button stations.
h. Power transfer equipment.

i. Contactors.

3.2 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach nonadhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

F. Color-Coding for Phase and Voltage Level Identification, 600 V and Less: Use the colors listed below for ungrounded service, feeder, and branch-circuit conductors.

1. Color shall be factory applied.
2. Colors for 208/120-V Circuits:

   a. Phase A: Black.
   b. Phase B: Red.
   c. Phase C: Blue.

3. Colors for 480/277-V Circuits:

   a. Phase A: Brown.
   b. Phase B: Orange.
   c. Phase C: Yellow.

END OF SECTION

SECTION 26 22 00

DRY-TYPE TRANSFORMERS (600 V AND LESS)

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following types of dry-type transformers rated 600 V and less, with capacities up to 1000 kVA:

1. Distribution transformers.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Wiring and connection diagrams.

C. Output Settings Reports: Record of tap adjustments specified in Part 3.

1.3 QUALITY ASSURANCE

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

B. Comply with IEEE C 57.12.91.

C. Transformers shall comply with energy efficiency standards as outlined in the Florida Building Code.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Temporary Heating: Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit, throughout periods during which equipment is not energized and when transformer is not in a space that is continuously under normal control of temperature and humidity.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Retain above for nonproprietary or below for semiproprietary specification. Refer to Division 1 Section "Product Requirements."

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Square D/Groupe Schneider NA.

2.2 MATERIALS

A. Description: Factory-assembled and -tested, air-cooled units for 60-Hz service.

B. Cores: Grain-oriented, non-aging silicon steel.

C. Coils: Continuous windings without splices, except for taps.

   1. Internal Coil Connections: Brazed or pressure type.
   2. Coil Material: Copper.

2.3 DISTRIBUTION TRANSFORMERS

A. Comply with NEMA ST 20, and list and label as complying with UL 1561.

B. Cores: One leg per phase.

C. Enclosure: Ventilated, NEMA 250, Type 2 Indoor. Type 3r Outdoor.

   1. Core and coil shall be encapsulated within resin compound, sealing out moisture and air.
   2. Finish: Comply with NEMA 250 for "Indoor Corrosion Protection."
   3. Finish Color: Gray.

D. Enclosure: Ventilated, NEMA 250, Type 3R Outdoor.

   1. Core and coil shall be encapsulated within resin compound, sealing out moisture and air.
   2. Finish: Comply with NEMA 250 for "Outdoor Corrosion Protection."
   3. Finish Color: Gray.

E. Insulation Class: 220 deg C, UL-component-recognized insulation system with a maximum of 150 deg C rise above 40 deg C ambient temperature.

F. Taps for Transformers 7.5 to 24 kVA: Two 5 percent taps above and below rated voltage.

G. Taps for Transformers 25 kVA and Larger: Two 2.5 percent taps above and two 2.5 percent taps below normal full capacity.

H. Wall Brackets: Manufacturer's standard brackets.

2.4 SOURCE QUALITY CONTROL

A. Test and inspect transformers according to IEEE C57.12.91.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wall-mounting transformers level and plumb with wall brackets fabricated by transformer manufacturer.

B. Install floor-mounting transformers level on concrete bases. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit and 4 inches (100 mm) high.

3.2 CONNECTIONS

A. Ground equipment according to Division 26 Section "Grounding and Bonding."

B. Connect wiring according to Division 26 Section "Conductors and Cables."

3.3 ADJUSTING

A. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 10 percent and not being lower than nameplate voltage minus 5 percent. Submit recording and tap settings as test results.

END OF SECTION

SECTION 26 24 16

PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes distribution panelboards and lighting and appliance branch-circuit panelboards.

1.2 SUBMITTALS

A. Product Data: For each type of panelboard, overcurrent protective device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:

   a. Enclosure types and details for types other than NEMA 250, Type 1.
   b. Bus configuration, current, and voltage ratings.
   c. Short-circuit current rating of panelboards and overcurrent protective devices.
   d. UL listing for series rating of installed devices.
   e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

2. Wiring Diagrams: Power, signal, and control wiring.
3. Field quality-control test reports.
4. Operation and maintenance data.

1.3 QUALITY ASSURANCE

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

B. Comply with NEMA PB 1.

C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Panelboards, Overcurrent Protective Devices, Controllers, Contactors, and Accessories:
   a. Square D.

2.2 MANUFACTURED UNITS

A. Enclosures: Surface-mounted cabinets. NEMA PB 1, Type 1.

1. Rated for environmental conditions at installed location.

   a. Outdoor Locations: NEMA 250, Type 3R.
   b. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.

B. Phase and Ground Buses: Hard-drawn copper, 98 percent conductivity.

C. Conductor Connectors: Suitable for use with conductor material.

1. Ground Lugs and Bus Configured Terminators: Compression type.

D. Service Equipment Label: UL labeled for use as service equipment for panelboards with main service disconnect switches.

E. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices.

F. Panelboard Short-Circuit Rating:

1. UL label indicating series-connected rating with integral or remote upstream overcurrent protective devices. Include size and type of upstream device allowable, branch devices allowable, and UL series-connected short-circuit rating.

2.3 DISTRIBUTION PANELBOARDS

A. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

B. Main Overcurrent Protective Devices: Circuit breaker.

C. Branch Overcurrent Protective Devices:

1. For Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
2. For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

B. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.5 OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker: UL 489, with series-connected rating to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
2. GFCI Circuit Breakers: Single- and two-pole configurations with 5-mA trip sensitivity.
3. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles.

a. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
b. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
c. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.

2.6 ACCESSORY COMPONENTS AND FEATURES

A. Furnish accessory set including tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Comply with mounting and anchoring requirements specified in Division 16 Section "Seismic Controls for Electrical Work."

C. Mount top of trim 74 inches (1880 mm) above finished floor, unless otherwise indicated.

D. Mount plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.

E. Install overcurrent protective devices and controllers.

1. Set field-adjustable switches and circuit-breaker trip ranges.

F. Install filler plates in unused spaces.

G. Stub four 1-inch (27-GRC) empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch (27-GRC) empty conduits into raised floor space or below slab not on grade.

H. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section "Electrical Identification."

I. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

J. Ground equipment according to Division 16 Section "Grounding and Bonding."

K. Connect wiring according to Division 16 Section "Conductors and Cables."

3.2 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

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

1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Single and duplex receptacles, and ground-fault circuit interrupters.
2. Single- and double-pole snap switches and dimmer switches.
3. Device wall plates.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

C. Field quality-control test reports.

1.3 QUALITY ASSURANCE

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

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Wiring Devices:

a. Bryant Electric, Inc./Hubbell Subsidiary.
b. Eagle Electric Manufacturing Co., Inc.
c. Hubbell Incorporated; Wiring Device-Kellems.
d. Leviton Mfg. Company Inc.
e. Pass & Seymour/Legrand; Wiring Devices Div.
f.

2.2 RECEPTACLES

A. Straight-Blade-Type Receptacles: Comply with NEMA WD 1, NEMA WD 6, DSCC W-C-596G, and UL 498.

B. Straight-Blade and Locking Receptacles: Heavy-Duty grade.

C. GFCI Receptacles: Straight blade, non-feed-through type, Heavy-Duty grade, with integral NEMA WD 6, Configuration 5-20R duplex receptacle; complying with UL 498 and UL 943. Design units for installation in a 2-3/4-inch- (70-mm-) deep outlet box without an adapter.

2.3 SWITCHES

A. Single- and Double-Pole Switches: Comply with DSCC W-C-896F and UL 20.

B. Snap Switches: Heavy-Duty grade, quiet type.

C. Combination Switch and Receptacle: Both devices in a single gang unit with plaster ears and removable tab connector that permit separate or common feed connection.

1. Switch: 20 A, 120/277-V ac.
2. Receptacle: NEMA WD 6, Configuration 5-20R.

D. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on/off switches and audible frequency and EMI/RFI filters.

1. Control: Continuously adjustable slider; with single-pole or three-way switching to suit connections.
2. Incandescent Lamp Dimmers: Modular, 120 V, 60 Hz with continuously adjustable rotary knob, toggle switch, or slider; single pole with soft tap or other quiet switch; EMI/RFI filter to eliminate interference; and 5-inch (130-mm) wire connecting leads.
3. LED Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 10 percent of full brightness.

2.4 WALL PLATES

A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Stainless Steel.
3. Material for Unfinished Spaces: Galvanized steel.
4. Material for Wet Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."

2.5 FLOOR SERVICE FITTINGS

A. Type: Modular, flush-type, dual-service units suitable for wiring method used.

B. Compartments: Barrier separates power from voice and data communication cabling.

C. Service Plate: Rectangular with satin finish.

D. Power Receptacle: NEMA WD 6, Configuration 5-20R, gray finish, unless otherwise indicated.

E. Voice and Data Communication Outlet: Four modular, keyed, color-coded, RJ-45 Category 6 jacks for UTP cable.

2.6 FINISHES

A. Color:

1. Wiring Devices Connected to Normal Power System: Grey, unless otherwise indicated or required by NFPA 70.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install devices and assemblies level, plumb, and square with building lines.

B. Install wall dimmers to achieve indicated rating after derating for ganging.

C. Install unshared neutral conductors on line and load side of dimmers.

D. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

E. Remove wall plates and protect devices and assemblies during painting.

F. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 IDENTIFICATION

A. Comply with Division 26 Section "Electrical Identification."

1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 CONNECTIONS

A. Ground equipment according to Division 16 Section "Grounding and Bonding."

B. Connect wiring according to Division 16 Section "Conductors and Cables."

3.4 FIELD QUALITY CONTROL

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

1. After installing wiring devices and after electrical circuitry has been energized, test for proper polarity, ground continuity, and compliance with requirements.
2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

B. Remove malfunctioning units, replace with new units, and retest as specified above.

END OF SECTION

SECTION 26 28 13

FUSES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Cartridge fuses rated 600 V and less for use in switches and controllers.

1.2 SUBMITTALS

A. Product Data: For each fuse type indicated.

B. Operation and maintenance data.

1.3 QUALITY ASSURANCE

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

B. Comply with NEMA FU 1.

C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Cooper Bussman, Inc.
2. Eagle Electric Mfg. Co., Inc.; Cooper Industries, Inc.
3. Ferraz Shawmut, Inc.
4. Tracor, Inc.; Littelfuse, Inc. Subsidiary.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuse; class and current rating indicated; voltage rating consistent with circuit voltage.

PART 3 - EXECUTION

3.1 FUSE APPLICATIONS

A. Feeders: Class J, time delay.

B. Motor Branch Circuits: Class RK5, time delay.

C. Other Branch Circuits: Class J, time delay.

3.2 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.3 IDENTIFICATION

A. Install labels indicating fuse replacement information on inside door of each fused switch.

END OF SECTION

SECTION 26 28 16

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following individually mounted, enclosed switches and circuit breakers:

1. Fusible switches.
2. Nonfusible switches.
3. Enclosures.

1.2 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Field quality-control test reports.

D. Operation and maintenance data.

1.3 QUALITY ASSURANCE

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

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

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

2.2 FUSIBLE AND NONFUSIBLE SWITCHES

A. Available Manufacturers:

1. Square D/Group Schneider.

B. Fusible Switch, 1200 A and Smaller: NEMA KS 1, Type HD, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

C. Nonfusible Switch, 1200 A and Smaller: NEMA KS 1, Type HD, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

D. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded, and bonded; and labeled for copper and aluminum neutral conductors.
3. Auxiliary Contact Kit: Auxiliary set of contacts arranged to open before switch blades open.

2.3 MOLDED-CASE CIRCUIT BREAKERS AND SWITCHES

A. Available Manufacturers:
1. Square D/Group Schneider.

B. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller and let-through ratings less than NEMA FU 1, RK-5.

C. Molded-Case Circuit-Breaker Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Mechanical style suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
4. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.

2.4 ENCLOSURES

A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.

1. Outdoor Locations: NEMA 250, Type 3R.
2. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordinate size and location of concrete bases. Verify structural requirements with structural engineer.

B. Concrete base is specified in Division 16 Section "Basic Electrical Materials and Methods”.

C. Comply with applicable portions of NECA 1, NEMA PB 1.1, and NEMA PB 2.1 for installation of enclosed switches and circuit breakers.

D. Mount individual wall-mounting switches and circuit breakers with tops at uniform height, unless otherwise indicated. Anchor floor-mounting switches to concrete base.

E. Comply with mounting and anchoring requirements specified in Division 16 Section "Seismic Controls for Electrical Work."

F. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

G. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section "Electrical Identification."

3.2 FIELD QUALITY CONTROL

A. Prepare for acceptance testing as follows:

1. Inspect mechanical and electrical connections.
2. Verify switch and relay type and labeling verification.
3. Verify rating of installed fuses.

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

1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

END OF SECTION

SECTION 26 43 13

SURGE PROTECTION DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes field-mounted TVSS for low-voltage (120 to 600 V) power distribution and control equipment.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating weights, electrical characteristics, furnished specialties, and accessories.

B. Field quality-control reports.

C. Operation and maintenance data.

D. Warranties: Sample of special warranties.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency, and marked for intended location and application.

B. Comply with IEEE C62.41.2 and test devices according to IEEE C62.45. C.

Comply with NEMA LS 1.

D. Comply with UL 1283 and UL 1449. E. Comply with NFPA 70.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of surge suppressors that fail in materials or workmanship within specified warranty period.
1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SERVICE ENTRANCE SUPPRESSORS

A. Manufacturers: Basis of design, Subject to compliance with requirements, Square D; a brand of Schneider
Electric.

B. Surge Protection Devices:
1. Non-modular.
2. LED indicator lights for power and protection status.
3. Comply with UL 1449.
4. Fuses, rated at 200-kA interrupting capacity.
5. Fabrication using bolted compression lugs for internal wiring.
6. Integral disconnect switch.
7. Redundant suppression circuits.
8. Arrangement with copper bus bars and for bolted connections to phase buses, neutral bus, and ground bus.
9. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
10. LED indicator lights for power and protection status.

C. Peak Single-Impulse Surge Current Rating: 240 kA per phase.

D. Minimum single impulse current ratings, using 8-by-20-mic.sec waveform described in IEEE C62.41.2
1. Line to Neutral: 100,000 A.
2. Line to Ground: 100,000 A.
3. Neutral to Ground: 50,000 A.

E. Protection modes and UL 1449 SVR for grounded wye circuits with 480Y/277 V and 208Y/120 V, 3-phase, 4- wire circuits shall be as follows:
1. Line to Neutral: 800 V for 480Y/277 V and 400 V for 208Y/120 V.
2. Line to Ground: 800 V for 480Y/277 V and 400 V for 208Y/120 V.
3. Neutral to Ground: 800 V for 480Y/277 V and 400 V for 208Y/120 V.

2.2 PANELBOARD SUPPRESSORS

A. Manufacturers: Basis of design, Subject to compliance with requirements, provide Square D; a brand of
Schneider Electric.

B. Surge Protection Devices:
1. Non-modular.
2. LED indicator lights for power and protection status.
3. Fuses, rated at 200-kA interrupting capacity.
4. Fabrication using bolted compression lugs for internal wiring.
5. Integral disconnect switch.
6. Redundant suppression circuits.
7. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
8. LED indicator lights for power and protection status.

C. Peak Single-Impulse Surge Current Rating: 120 kA per phase.

D. Minimum single impulse current ratings, using 8-by-20-mic.sec waveform described in IEEE C62.41.2:
1. Line to Neutral: 100,000 A.
2. Line to Ground: 100,000 A.
3. Neutral to Ground: 50,000 A.

E. Protection modes and UL 1449 SVR for grounded wye circuits with 480Y/277 V and 208Y/120 V, 3-phase, 4- wire circuits shall be as follows:
1. Line to Neutral: 800 V for 480Y/277 V and 400 V for 208Y/120 V.
2. Line to Ground: 800 V for 480Y/277 V and 400 V for 208Y/120 V.
3. Neutral to Ground: 800 V for 480Y/277 V and 400 V for 208Y/120 V.

F. Protection modes and UL 1449 SVR for 240 V, 480 V, or 600 V, 3-phase, 3-wire, delta circuits shall be as follows:
1. Line to Line: 2000 V for 480 V and 1000 V for 240 V.
2. Line to Ground: 1500 V for 480 V and 800 V for 240 V.

2.3 SIGNAL LINE PROTECTION

A. Signal line protection shall be solid state, silicon avalanche diode circuitry for protection from over voltages on 2 or 4 wire signal lines such as balanced pair telephone, metallic pair telephone, buried and overhead field cable, remote radio equipment, and control systems. Connect unit ground lug or wire to protected equipment grounding system with a No. 12 green insulated stranded ground wire as short as possible.

2.4 CABLE PROTECTION

A. 75 ohm coaxial cable protectors shall be solid state, silicon avalanche diode circuitry for non-interrupting over-voltage protection of RG-59/U coaxial cable. Unit shall be provided with one female input connector for "F" series male connector, one output RG-59/U coax cable terminated with an "F" series male cable end connector and a #16 stranded 18" long grounding wire on output end of unit or similar arrangement. Securely mount adjacent to protection equipment and ground to equipment or local building ground if an equipment ground is not available.

2.5 ENCLOSURES

A. Indoor Enclosures: NEMA 250 Type 1.

B. Outdoor Enclosures: NEMA 250 Type 3R.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install TVSS devices at service entrance on load side, with ground lead bonded to service entrance ground.

B. Install TVSS devices for panelboards and auxiliary panels with conductors or buses between suppressor and points of attachment as short and straight as possible. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground.

1. Provide multiple, 60-A circuit breaker as a dedicated disconnecting means for TVSS unless otherwise indicated.

3.2 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA ATS, "Surge Arresters, Low-Voltage Surge Protection Devices" Section. Certify compliance with test parameters.

2. After installing TVSS devices but before electrical circuitry has been energized, test for compliance with requirements.

3. Complete startup checks according to manufacturer's written instructions. C.

TVSS device will be considered defective if it does not pass tests and inspections. D.

Prepare test and inspection reports.

3.3 STARTUP SERVICE

A. Do not energize or connect service entrance equipment and panelboards to their sources until TVSS devices are installed and connected.

B. Do not perform insulation resistance tests of the distribution wiring equipment with the TVSS installed. Disconnect before conducting insulation resistance tests, and reconnect immediately after the testing is over.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to maintain TVSS devices.

END OF SECTION

SECTION 26 51 00

INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes the following requirements for LED luminaires:
1. Efficacy
2. Materials.
3. Finishes.
4. Luminaire support.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color Rendering Index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. LED: Light-emitting diode.

F. Lumen: Measured output of lamp and luminaire, or both.

G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product, arranged by designation.

B. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale and coordinated with each other, using input from installers of the items involved:

B. Product Certificates: For each type of luminaire. C. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.7 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

B. Warranty Period: Five year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Standards:
1. UL Listing: Listed for damp location.
2. Recessed luminaires shall comply with NEMA LE 4.

C. CRI of minimum 80. CCT of 5000 K depending on fixture selection.

D. Rated lamp life of 75,000 hours to L70.

E. Lamps dimmable from 100 percent to 1 percent of maximum light output.

F. Internal driver.

G. Nominal Operating Voltage: 120 V ac or 277 V ac.
1. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.

H. Housings:
1. Painted steel housing and heat sink.
2. Painted finish.

2.2 Efficacy

A. Minimum allowable efficacy of 80 lumens per watt.

2.6 MATERIALS

A. Metal Parts:
1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging

B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

C. Housings:
1. Painted steel housing and heat sink.
2. White painted finish.

2.7 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.8 LUMINAIRE SUPPORT

A. Comply with requirements in "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage.

D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise

indicated. C. Supports: Sized and rated for luminaire weight.

D. Wall-Mounted Luminaire Support:
1. Attached to structural members in stair well or attached to a minimum 20 gauge backing plate attached to structural members.
2. Do not attach luminaires directly to gypsum board.

E. Ceiling-Mounted Luminaire Support:
1. Ceiling mount with two 5/32-inch-diameter aircraft cable supports adjustable to 120 inches in length.
2. Ceiling mount with pendant mount with 5/32-inch-diameter aircraft cable supports adjustable to 120 inches in length.
3. Ceiling mount with hook mount.

F. Suspended Luminaire Support:
1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.

2. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.

3. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

G. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.

2. Secure luminaire using approved fasteners in a minimum of four locations, spaced near corners of luminaire.

H. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

I. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.

B. Luminaire will be considered defective if it does not pass operation tests inspections.

C. Prepare test and inspection reports.

END OF SECTION

SECTION 26 56 00

EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Exterior luminaires with lamps and ballasts, but not mounted on exterior surfaces of buildings.

B. See Division 16 Section "Interior Lighting" for exterior luminaires normally mounted on exterior surfaces of buildings.

1.2 SUBMITTALS

A. Product Data: For each luminaire, arranged in the order of lighting unit designation. Include data on features, accessories, finishes.

B. Shop Drawings: Anchor-bolt templates keyed to specific poles and certified by manufacturer.

1. Include wiring diagrams.

C. Operation and maintenance data.

1.3 QUALITY ASSURANCE

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

B. FMG Compliance: Fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FMG.

C. Comply with IEEE C2, "National Electrical Safety Code."

D. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

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

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install lamps in each fixture.

B. Luminaire Attachment: Fasten to indicated structural supports.

C. Adjust luminaires that require field adjustment or aiming.

END OF SECTION

SECTION 27 10 00

VOICE AND DATA COMMUNICATION CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following items for wiring systems used as signal pathways for voice and high-speed data transmission:

1. Unshielded twisted-pair cabling.
2. Workstation outlets.

1.2 SUBMITTALS

A. Product Data: For each component specified.

B. Shop Drawings:

1. Include dimensioned plan and elevation views of telecommunications equipment rooms, labeling each individual component.
2. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
3. Cabling Administration Drawings.
4. Wiring diagrams to show typical wiring schematics including the following:

   a. Workstation outlets, jacks, and jack assemblies.
   b. Patch cords.
   c. Patch panels.
   d. Fiber-optic boxes.

C. Qualification Data: For Installer.

D. Field quality-control test reports.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Cabling installer must have on staff personnel certified by BICSI.

1. Layout Responsibility: Preparation of Shop Drawings by an RCDD.
2. Installation Supervision: Installation shall be under the direct supervision of a Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.
3. Testing Agency's Field Supervisor: Person currently certified by BICSI as an RCDD to supervise field quality-control testing.

B. Source Limitations: Obtain all products except cables through one source from a single manufacturer.

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

D. Comply with NFPA 70, "National Electrical Code."

1.4 COORDINATION

A. Coordinate layout and installation of voice and data communication cabling with Owner's telecommunications and LAN equipment and service suppliers. Coordinate service entrance arrangement with local exchange carrier.

1. Meet jointly with telecommunications and LAN equipment suppliers, local exchange carrier representatives, and Owner to exchange information and agree on details of equipment arrangements and installation interfaces.
2. Record agreements reached in meetings and distribute to other participants.
3. Adjust arrangements and locations of distribution frames and cross-connect and patch panels in equipment rooms and wiring closets to accommodate and optimize arrangement and space requirements of telephone switch and LAN equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

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

2.2 SYSTEM REQUIREMENTS

A. Coordinate the features of materials and equipment so they form an integrated system. Match components and interconnections for optimum future performance.

B. Expansion Capability: Unless otherwise indicated, provide spare fibers and conductor pairs in cables, positions in cross-connect and patch panels, and terminal strips to accommodate 20 percent future increase in the number of workstations shown on Drawings. This expansion requirement does not apply to horizontal cable from workstation outlet to first terminal board.

2.3 MOUNTING ELEMENTS

A. Backboards: 3/4-inch (19-mm), interior-grade, fire-retardant-treated plywood.

B. Power Strips: For mounting on backboards, with 20-A, 120-V ac, NEMA WD 6, Configuration 5-20R receptacles, number as indicated, but in no case fewer than 3, and including the following:

1. LED indicator lights for power and protection status.
2. LED indicator lights for reverse polarity and open outlet ground.
3. Circuit breaker and thermal fusing. When protection is lost, circuit opens and cannot be reset.
4. Circuit breaker and thermal fusing. Unit continues to supply power if protection is lost.
5. Cord connected with 15-foot (4.5-m) line cord.
6. Rocker-type on-off switch, illuminated when in on position.
7. Peak Single-Impulse Surge Current Rating: 13 kA per phase.
8. Protection modes shall be line-to-neutral, line-to-ground, and neutral-to-ground. UL 1449 clamping voltage for all 3 modes shall be not more than 330 V.
9. One RJ11/12C telephone line protector, suitable for modem connection. Maximum clamping voltage 220 peak on pins No. 3 and No. 4.

2.4 UNSHIELDED TWISTED-PAIR CABLING

A. Cable Manufacturers:
   1. Berk Tek.

B. Available Terminal and Connector Component and Distribution Rack Manufacturers:
   1. Panduit Corp.

C. 100-Ohm UTP: Comply with UL 444.

D. Horizontal Copper Cable:

   1. No. 24 AWG, 100 ohm, four pair.
   2. Comply with TIA/EIA-568-B.2, Category 6.
   3. NFPA 70, type CMP.
   4. Cable Jacket Color: Blue/Yellow.
   5. Plenum rated.

E. Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, using modules designed for punch-down caps or tools.

   1. IDC Terminal Block Modules: Integral with connector bodies, including plugs and jacks where indicated.
   2. IDC Connecting Hardware: Consistent throughout Project.

F. Cross-Connect Panel: Modular array of IDC terminal blocks arranged to terminate building cables and permit interconnection between cables.

   1. Number of Terminals per Field: One for each conductor in assigned cables plus 5 percent spare.

G. Patch Panel: Comply with TIA/EIA-568-B.2, meeting or exceeding cable performance. Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.

   1. Number of Jacks per Field: One for each four-pair conductor group of indicated cables, plus spares and blank positions adequate to satisfy specified expansion criteria.

H. Jacks and Jack Assemblies: Modular, color-coded, RJ-45 receptacle units with integral IDC-type terminals. Use keyed jacks for data service.

I. Patch Cords: Factory-made, four-pair cables in 48-inch (1200-mm) lengths; terminated with RJ-45 plug at each end. Use keyed plugs for data service.

2.5 WORKSTATION OUTLETS

A. Jacks: 100-ohm, balanced, twisted-pair connector; four-pair, modular, RJ-45, CAT 6. Comply with TIA/EIA-568-B.1.

B. Workstation Outlets: Dual jack-connector assemblies mounted in single or multigang faceplate.

1. Faceplate: Stainless Steel.
2. Mounting: Flush, unless otherwise indicated.
3. Legend: Factory-labeled, top jack "Voice" and bottom jack "Data," by silk-screening or engraving.
4. Legend: Machine-printed, adhesive tape label identifying the circuit.

2.6 BACKBOARDS

A. A-C, void-free plywood, 84 inches (2130 mm) high and 3/4-inch (19 mm) thick, fire rated.

2.7 GROUNDING AND BONDING

A. Materials: Comply with NFPA 70, TIA/EIA-607, and UL 467.

2.8 IDENTIFICATION PRODUCTS

A. Available Manufacturers:

1. Brady Worldwide, Inc.
2. HellermannTyton.
3. Kroy LLC.
4. Panduit Corp.

B. Comply with TIA/EIA-606-A and with applicable requirements in Division 16 Section "Electrical Identification."

C. Cable Labels: Self-adhesive vinyl or vinyl-cloth wraparound tape markers, machine printed with alphanumeric cable designations.

PART 3 - EXECUTION

3.1 INSTALLATION STANDARDS

A. Comply with BICSI TCI, TIA/EIA-568-B.1, TIA/EIA-568-B.2, TIA/EIA-568-B.3, and TIA/EIA-569-A.

3.2 EXAMINATION

A. Examine pathway elements intended for cables.

1. Verify proposed routes of pathways. Check raceways, cable trays, and other elements for compliance with space allocations, clearances, installation tolerances, hazards to cable installation, and other conditions affecting installation. Verify that cabling can be installed complying with EMI clearance requirements.
2. Prepare wall penetrations and verify that penetrations of rated fire walls are made using products labeled for type of wall penetrated.
3. Identify plan to support cables and raceways in suspended ceilings. Verify weight of individual types and sizes of cables. Verify that load capacity of cable support structures is adequate for each pathway.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 APPLICATION OF MEDIA

A. Horizontal Cable for Data Service: Use UTP Category 6 fiber-optic cable for runs between wiring closets and workstation outlets.

B. Horizontal Cable for Voice Service: Use UTP Category 6 cable for runs between wiring closets and workstation outlets.

3.4 INSTALLATION

A. Comply with NECA 1.

B. Wiring Method: Install cables in raceway and cable tray except within cabinets, desks, and counters. Use UL-listed plenum cable in environmental air spaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces. Cable trays are specified in Division 16 Section "Cable Trays." Raceways and boxes are specified in Division 16 Section "Raceways and Boxes."

C. Cable Installation:

1. Install exposed cables parallel and perpendicular to surfaces or exposed structural members and follow surface contours where possible.
2. Make splices, taps, and terminations only at indicated outlets, terminals, and cross-connect and patch panels.
3. Pulling Cable: Do not exceed manufacturer's written recommended pulling tensions. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
4. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
5. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, frames, and terminals.
6. Install UTP cables using techniques, practices, and methods that are consistent with Category 6 rating of components and that ensure Category 6 performance of completed and linked signal paths, end to end.

a. Do not untwist more than 1/2 inch (12 mm) of Categories 5e and 6 cables at connector terminations.

D. Wiring within Wiring Closets and Enclosures:

1. Install plywood backboards on walls of equipment rooms and wiring closets from floor to ceiling.
2. Mount patch panels, terminal strips, and other connecting hardware on backboards or racks as indicated.
3. Group connecting hardware for cables into separate logical fields.
4. Train conductors to terminal points with no excess.
5. Use lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.

E. Separation from EMI Sources: Comply with BICSI TDM and TIA/EIA-569-A recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment. Comply with the following minimum separation distances from possible sources of EMI:

1. Separation between unshielded power lines or electrical equipment in proximity to open cables or cables in nonmetallic raceways is as follows:

   a. Electrical Equipment Rating Less Than 2 kVA: 5 inches (127 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: 12 inches (300 mm).
   c. Electrical Equipment Rating More Than 5 kVA: 24 inches (610 mm).

2. Separation between unshielded power lines or electrical equipment in proximity to cables in grounded metallic raceways is as follows:

   a. Electrical Equipment Rating Less Than 2 kVA: 2-1/2 inches (64 mm).
   b. Electrical Equipment Rating between 2 and 5 kVA: 6 inches (150 mm).
   c. Electrical Equipment Rating More Than 5 kVA: 12 inches (300 mm).

3. Separation between power lines and electrical equipment located in grounded metallic conduits or enclosures in proximity to cables in grounded metallic raceways is as follows:

   a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
   b. Electrical Equipment Rating between 2 and 5 kVA: 3 inches (76 mm).
   c. Electrical Equipment Rating More Than 5 kVA: 6 inches (150 mm).

4. Electrical Motors and Transformers, 5 kVA or HP and Larger: 48 inches (1200 mm).
5. Fluorescent Fixtures: 5 inches (127 mm).

F. Conduit:

1. Comply with TIA/EIA-569-A for maximum length of conduit and bends between pull points, and for pull-box sizing.
2. Use manufactured conduit sweeps and long-radius ells whenever possible.
3. In telecommunications rooms, position conduit ends adjacent to a corner on backboard (in case of a single piece of plywood) or in the corner of room (where multiple sheets of plywood are installed around perimeter walls of room). Use cable trays to route cables if conduits cannot be located in these positions. Secure conduits to backboard when entering room from overhead. Extend conduits 1 to 3 inches (25 to 76 mm) in finished floor.

G. Backboards: Install plywood with 84-inch (2130-mm) dimension from floor up toward ceiling. Butt adjacent sheets tightly, and form smooth gap-free corners.

3.5 GROUNDING

A. Comply with Division 16 Section "Grounding and Bonding" and with TIA/EIA 607.

B. Grounding Points:

1. Locate grounding terminals in each equipment room, wiring closet, rack, and cabinet.
2. Telecommunications Grounding Busbars: Mount on wall of telecommunications entrance facility, equipment room, and closet, with standoff insulators.

C. Bonding Conductors:

1. Extend from telecommunications entrance facility to electrical entrance facility and connect to grounding electrode.
2. Where a panelboard for telecommunications is located in same room or space as a grounding busbar, bond to equipment ground bus of electrical panelboard.
3. Extend from telecommunications entrance facility to grounding busbars.
4. Extend from grounding busbars to ground terminals in equipment racks and cabinets.
5. Extend from grounding busbars to building metal frame within room, or to metal frame external to room but readily accessible.

D. Special Requirements:

1. Bonding conductors shall be insulated copper, No. 6 AWG minimum.
2. Install only in nonmetallic conduit, unless specifically required for protection of conductor. Metallic conduit, if used, shall be RMC. For RMC that exceeds 36 inches (915 mm) in length, conductors shall be bonded at each end of conduit.
3. Bonding conductors shall be installed without splices unless approved by Architect because of special circumstances. Where splices are necessary, they shall be accessible and shall be located in telecommunications spaces. Splices shall be by irreversible compression connectors or by exothermic welding.

3.6 IDENTIFICATION

A. In addition to requirements in this Article, comply with TIA/EIA-606-A and with applicable requirements in Division 16 Section "Electrical Identification."
1. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.

B. Use logical and systematic designations for facility's architectural arrangement and nomenclature, and a consistent color-coded identification of individual conductors.

C. Cable and Wire Identification:

1. Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.

3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet (4.5 m).
4. Label each terminal strip and screw terminal in each cabinet, rack, or panel.

    a. All wiring conductors connected to terminal strips shall be individually numbered, and each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
    b. Label each unit and field within distribution racks and frames.

5. Within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
6. At Workstations: Attach label to device plate.

D. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

E. Cabling Administration Drawings: Show building floor plans with cable administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606-A. Furnish electronic record of all drawings, in software and format selected by Owner.

3.7 FIELD QUALITY CONTROL

A. Perform field tests and inspections according to TIA/EIA-568-B.2 and prepare test reports.

B. Remove and replace cabling where test results indicate that they do not comply with specified requirements.

C. Retest and inspect cabling to determine compliance of replaced or additional work with specified requirements.

3.8 DEMONSTRATION

A. Train Owner's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets. Refer to Division 1 Section "Demonstration and Training."

END OF SECTION

SECTION 28 46 00

FIRE ALARM

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes fire alarm systems.

B. See Division 8 Section "Door Hardware" for door closers and holders with associated smoke detectors, electric door locks, and release devices that interface with the fire alarm system.

C. Definitions:

1. FACP: Fire alarm control panel.
2. LED: Light-emitting diode.
3. Definitions in NFPA 72 apply to fire alarm terms used in this Section.

D. System Description:

1. Noncoded, addressable system; multiplexed signal transmission dedicated to fire alarm service only.

E. Performance Requirements:

1. Comply with NFPA 72.
2. Fire alarm signal initiation shall be by one or more of the following devices:

   a. Manual stations.
   b. Heat detectors.
   c. Smoke detectors.
   d. Verified automatic alarm operation of smoke detectors.
   e. Automatic sprinkler system water flow.

3. Fire alarm signal shall initiate the following actions:

   a. Alarm notification appliances shall operate continuously.
   b. Identify alarm at the FACP and remote annunciators.
   c. De-energize electromagnetic door holders.
   d. Transmit an alarm signal to the remote alarm receiving station.
   e. Unlock electric door locks in designated egress paths.
   f. Release fire and smoke doors held open by magnetic door holders.
   g. Switch heating, ventilating, and air-conditioning equipment controls to fire alarm mode.
   h. Close smoke dampers in air ducts of system serving zone where alarm was initiated.
   i. Record events in the system memory.
   j. Return elevator to ground floor.

4. System trouble signal initiation shall be by one or more of the following devices or actions:

a. Open circuits, shorts and grounds of wiring for initiating device, signaling line, and notification-appliance circuits.
b. Opening, tampering, or removal of alarm-initiating and supervisory signal-initiating devices.
c. Loss of primary power at the FACP.
d. Ground or a single break in FACP internal circuits.
e. Abnormal ac voltage at the FACP.
f. A break in standby battery circuitry.
g. Failure of battery charging.
h. Abnormal position of any switch at the FACP or annunciator.

5. System Trouble and Supervisory Signal Actions: Ring trouble bell and annunciate at the FACP and remote annunciators. Record event.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:

1. System Operation Description: Detailed description for this Project, including method of operation and supervision of each type of circuit and sequence of operations for manually and automatically initiated system inputs and outputs. Manufacturer's standard descriptions for generic systems are not acceptable.
2. Device Address List: Coordinate with final system programming.
3. System riser diagram with device addresses, conduit sizes, and cable and wire types and sizes.
4. Wiring Diagrams: Power, signal, and control wiring. Include diagrams for equipment and for system with all terminals and interconnections identified. Show wiring color code.
5. Batteries: Size calculations.

C. Field quality-control test reports.

D. Operation and maintenance data.

E. Submittals to Authorities Having Jurisdiction: In addition to distribution requirements for submittals specified in Division 1 Section "Submittals," make an identical submittal to authorities having jurisdiction. To facilitate review, include copies of annotated Contract Drawings as needed to depict component locations. Resubmit if required to make clarifications or revisions to obtain approval. On receipt of comments from authorities having jurisdiction, submit them to Architect for review.

F. Documentation:

1. Approval and Acceptance: Provide the "Record of Completion" form according to NFPA 72 to Owner, Architect, and authorities having jurisdiction.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Existing FACP and Equipment:
   a. Firelite MS9200UDLS

2. Wire and Cable:

   a. Comtran Corporation.
   b. Helix/HiTemp Cables, Inc.; a Draka USA Company.
   c. Rockbestos-Suprenant Cable Corporation; a Marmon Group Company.
   d. West Penn Wire/CDT; a division of Cable Design Technologies.

3. Audible and Visual Signals:

   a. Amseco; a division of Kobishi America, Inc.
   b. Commercial Products Group.
   c. Gentex Corporation.
   d. System Sensor; a GE-Honeywell Company.

2.2 FACP

A. General Description:

1. Modular, power-limited design with electronic modules, UL 864 listed.
2. Addressable control circuits for operation of mechanical equipment.
3. Notification shall be by voice evacuation.

B. Alphanumeric Display and System Controls: Arranged for interface between human operator at the FACP and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

1. Annunciator and Display: Liquid-crystal type, three line(s) of 40 characters, minimum.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.

C. Circuits:

1. Signaling Line Circuits: NFPA 72, Class B.

   a. System Layout: Install no more than 50 addressable devices on each signaling line circuit.

2. Notification-Appliance Circuits: NFPA 72, Class B.
3. Actuation of alarm notification appliances, annunciation, elevator recall, shall occur within 10 seconds after the activation of an initiating device.
4. Electrical monitoring for the integrity of wiring external to the FACP for mechanical equipment shutdown and magnetic door-holding circuits is not required, provided a break in the circuit will cause doors to close and mechanical equipment to shut down.

D. Smoke-Alarm Verification:

1. Initiate audible and visible indication of an "alarm verification" signal at the FACP.
2. Activate a listed and approved "alarm verification" sequence at the FACP and the detector.
3. Record events.
4. Sound general alarm if the alarm is verified.
5. Cancel FACP indication and system reset if the alarm is not verified.

E. Notification-Appliance Circuit: Operation shall sound in a temporal pattern, complying with ANSI S3.41.

F. Elevator Controls: Heat detector operation shuts down elevator power by operating a shunt trip in a circuit breaker feeding the elevator.

G. Power Supply for Supervision Equipment: Supply for audible and visual equipment for supervision of the ac power shall be from a dedicated dc power supply, and power for the dc component shall be from the ac supply.

H. Alarm Silencing, Trouble, and Supervisory Alarm Reset: Manual reset at the FACP and remote annunciators, after initiating devices are restored to normal.

1. Silencing-switch operation halts alarm operation of notification appliances and activates an "alarm silence" light. Display of identity of the alarm zone or device is retained.
2. Subsequent alarm signals from other devices or zones reactivate notification appliances until silencing switch is operated again.
3. When alarm-initiating devices return to normal and system reset switch is operated, notification appliances operate again until alarm silence switch is reset.

I. Walk Test: A test mode to allow one person to test alarm and supervisory features of initiating devices. Enabling of this mode shall require the entry of a password. The FACP and annunciators shall display a test indication while the test is underway. If testing ceases while in walk-test mode, after a preset delay, the system shall automatically return to normal.

J. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, trouble, and supervisory signals to a remote alarm station through a digital alarm communicator transmitter and telephone lines.

K. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signal, supervisory and digital alarm communicator transmitter shall be powered by the 24-V dc source.

1. The alarm current draw of the entire fire alarm system shall not exceed 80 percent of the power-supply module rating.

2. Power supply shall have a dedicated fused safety switch for this connection at the service entrance equipment. Paint the switch box red and identify it with "FIRE ALARM SYSTEM POWER."

L. Secondary Power: 24-V dc supply system with batteries and automatic battery charger and an automatic transfer switch.

1. Batteries: Sealed lead calcium.
2. Battery and Charger Capacity: Comply with NFPA 72.

M. Surge Protection:
1. Install surge protectors recommended by FACP manufacturer. Install on all system wiring external to the building housing the FACP.

N. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.3 MANUAL FIRE ALARM BOXES

A. Description: UL 38 listed; finished in red with molded, raised-letter operating instructions in contrasting color. Station shall show visible indication of operation. Mounted on recessed outlet box; if indicated as surface mounted, provide manufacturer's surface back box.

1. Single-action mechanism, pull-lever type. With integral addressable module, arranged to communicate manual-station status (normal, alarm, or trouble) to the FACP.
2. Station Reset: Key- or wrench-operated switch.

2.4 SYSTEM SMOKE DETECTORS

A. General Description:

1. UL 268 listed, operating at 24-V dc, nominal.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
3. Multipurpose type, containing the following:

a. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
b. Piezoelectric sounder rated at 88 dBA at 10 feet (3 m) according to UL 464.
c. Heat sensor, combination rate-of-rise and fixed temperature.

4. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. Provide terminals in the fixed base for connection of building wiring.
5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
6. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status.

B. Photoelectric Smoke Detectors:

1. Sensor: LED or infrared light source with matching silicon-cell receiver.
2. Detector Sensitivity: Between 2.5 and 3.5 percent/foot (0.008 and 0.011 percent/mm) smoke obscuration when tested according to UL 268A.

C. Duct Smoke Detectors:

1. Photoelectric Smoke Detectors:

a. Sensor: LED or infrared light source with matching silicon-cell receiver.
b. Detector Sensitivity: Between 2.5 and 3.5 percent/foot (0.008 and 0.011 percent/mm) smoke obscuration when tested according to UL 268A.

2. UL 268A listed, operating at 24-V dc, nominal.
3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
4. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. The fixed base shall be designed for mounting directly to the air duct. Provide terminals in the fixed base for connection to building wiring.
5. Self-Restoring: Detectors shall not require resetting or readjustment after actuation to restore them to normal operation.
6. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status. Provide remote status and alarm indicator and test station where indicated.
7. Sampling Tubes: Design and dimensions as recommended by manufacturer for the specific duct size, air velocity, and installation conditions where applied.
8. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

2.5 HEAT DETECTORS

A. General: UL 521 listed.

B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F (57 deg C) or rate-of-rise of temperature that exceeds 15 deg F (8 deg C) per minute, unless otherwise indicated.

1. Mounting: Plug-in base, interchangeable with smoke-detector bases.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.

2.6 NOTIFICATION APPLIANCES

A. Description: Equipped for mounting as indicated and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly.

B. Speakers: Electric polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn.

C. Visible Alarm Devices: Xenon strobe lights listed under UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.

1. Rated Light Output: 15, 75, 110 candela selectable.
2. Strobe Leads: Factory connected to screw terminals.

2.7 MAGNETIC DOOR HOLDERS

A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching door plate.

1. Electromagnet: Requires no more than 3 W to develop 25-lbf (111-N) holding force.
2. Wall-Mounted Units: Flush mounted, unless otherwise indicated.
3. Rating: 24-V ac or dc.
4. Rating: 120-V ac.

B. Material and Finish: Match door hardware.

2.8 REMOTE ANNUNCIATOR

A. Description: Duplicate annunciator functions of the FACP for alarm, supervisory, and trouble indications. Also duplicate manual switching functions of the FACP, including acknowledging, silencing, resetting, and testing.

1. Mounting: Flush cabinet, NEMA 250, Class 1.

B. Display Type and Functional Performance: Alphanumeric display same as the FACP. Controls with associated LEDs permit acknowledging, silencing, resetting, and testing functions for alarm, supervisory, and trouble signals identical to those in the FACP.

2.9 ADDRESSABLE INTERFACE DEVICE

A. Description: Microelectronic monitor module listed for use in providing a system address for listed alarm-initiating devices for wired applications with normally open contacts.

B. Integral Relay: Capable of providing a direct signal to the elevator controller to initiate elevator recall.

2.10 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Listed and labeled according to UL 632.

B. Functional Performance: Unit receives an alarm, supervisory, or trouble signal from the FACP, and automatically captures one or two telephone lines and dials a preset number for a remote central station. When contact is made with the central station(s), the signal is transmitted. The unit supervises up to two telephone lines. Where supervising 2 lines, if service on either line is interrupted for longer than 45 seconds, the unit initiates a local trouble signal and transmits a signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. When telephone service is restored, unit

automatically reports that event to the central station. If service is lost on both telephone lines, the local trouble signal is initiated.

C. Secondary Power: Integral rechargeable battery and automatic charger. Battery capacity is adequate to comply with NFPA 72 requirements.

D. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

2.11 WIRE AND CABLE

A. Wire and cable for fire alarm systems shall be UL listed and labeled as complying with NFPA 70, Article 760.

B. Signaling Line Circuits: Twisted, shielded pair, not less than size as recommended by system manufacturer.

1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70 Article 760, Classification CI, for power-limited fire alarm signal service. UL listed as Type FPL, and complying with requirements in UL 1424 and in UL 2196 for a 2-hour rating.

C. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.

1. Low-Voltage Circuits: No. 16 AWG, minimum.
2. Line-Voltage Circuits: No. 12 AWG, minimum.

D. All cables shall be in conduit.

2.12 Voice Evacuation Control Panel.

A. The Voice Evacuation/Mass Notification panel shall comply with NFPA 72 requirements.

1.The Secondary Power Source of the Voice Evacuation/Mass Notification panel will be capable of providing at least 24 hours of backup power with the ability to sustain 15 minutes in alarm at the end of the backup period.

B. The Voice Evacuation/Mass Notification Control Panel shall contain a microprocessor-based Central Processing Unit (CPU). The CPU shall distribute and control emergency voice messages over the speaker circuits.

C. The system shall provide the capability to interface to **LOC** (**L**ocal **O**perator **C**onsole), Distributed Audio Amplifiers, Remote Page Unit, Remote Microphone, Fire Fighter Telephone Unit and Remote Telephone Zone Module from the same manufacturer.

D. Shall have as minimum requirements:

1. Integral 50 Watt, 25 Vrms audio amplifier with optional converter for 70.7 volt systems. The system shall be capable of expansion to 100 watts total via the insertion of an additional 50-watt audio amplifier module (can be used as a backup amplifier) into the same cabinet and expandable over 1100 watts.

2. Speaker circuit that can be wired both Class A and B.

3. Integral Digital Message Generator with a memory capacity for up to 60 seconds per messaging. The Digital Message Generator shall be capable of producing fourteen distinct messages (60 seconds each). Field-selectable message and custom message recording capability using the local microphone, a USB port, or an external audio input.

4. Built in alert tone patterns with ANSI, March Code, California,
Steady, Alert Tone, Hi-Lo, ANSI Whoop, Continuous Whoop, or No Tone is field programmable. Tone Prior to transmitting a message, the Voice Evacuation/Mass Notification Control Panel can be programmed to produce a pre-announce
and post-announce tone.

5. The Voice Evacuation/Mass Notification Control Panel will be capable of detecting and annunciating the following conditions: Loss of Power (AC and DC), System Trouble, Ground Fault, Alarm, Microphone Trouble, Message Generator Trouble, Tone Generator Trouble, and Amplifier Fault.

6. The Voice Evacuation/Mass Notification Control Panel shall be fully supervised including microphone, amplifier output, message generator, speaker wiring, and tone generation.

7. Speaker outputs shall be fully power-limited.

8. Amplifiers will be supplied power independently to eliminate a short on one circuit from affecting other circuits.

9. The Voice Evacuation/Mass Notification Control Panel will provide full supervision on both active (alarm or music) and standby conditions.

10. An optional zone splitter version shall be available that permits splitting speaker circuits into 8 specific zones.

11. An optional distributed amplifiers unit shall be available that permits splitting speaker circuits up to a total of 24 speaker zones.

12. Wiring terminals shall be removable terminal blocks (Wire Gauge 12 – 18 AWG) for ease of servicing.

13. Voice Evacuation/Mass Notification Control Panel will provide 2 amp
Notification Appliance Circuit (NAC) output with sync generator or follower for System Sensor, Wheelock or Gentex protocols. The NAC shall be capable of One (1) Style Y (Class B) or Style Z (Class A) circuit.

14. Shall have eight Command Input Circuits to activate messages via reverse polarity or contact closures.

15. Built in External Audio Input can be used for background music.

16. On-board battery charger which supports charging up to 26 AH batteries (cabinet holds up to 18AH batteries).

17. Programmable delay of immediate, 2 hours or 6 hours reporting of AC Loss.

18. Built in Piezo sounder for local trouble.

19. Stores the events in the 100 Event History log

20. Shall have Console Lamp Test switch and shall activate
all system LEDs including Remote Consoles.

21. Shall have three Form-C relays:
- AC Power Loss Relay
- System Trouble Relay
- MNS Active (For Mass Notification signage)

22. Shall have a Special Application (auxiliary power) output for addressable modules when interfaced with compatible addressable FACPs and End-of-Line power supervision relays.

23. Shall be capable of Speaker Volume Control. The Supervised Volume Control will allow manual volume setting for telephone paging and background music for a specific speaker or speaker zone.

24. Shall have a Night Ring input allows a building's Private Branch Exchange (PBX) to activate the Voice Evacuation/Mass Notification panel.

25. The Voice Evacuation/Mass Notification panel can communicate in any combination up to eight (8) external remote consoles:
- Optional Remote Microphone
- Optional Remote Page Unit
- Optional Local Operator Console

26. The Voice Evacuation/Mass Notification panel can communicate in any combination up to eight (8) external distributed audio amplifiers:
- Optional Distributed Amplifier, 50 watts.
- Optional Distributed Amplifier, 125 watts.

27. Shall be capable of integrating with firefighter telephone system that provides secure and reliable communications. The firefighter telephone system will allow for up to ten users to plug in to a remote telephone jack and communicate simultaneously within a building.

28. Shall be capable of secure access to the Voice Evacuation/Mass Notification panel via cell phone or other remote telephone.

29. The Voice Evacuation/Mass Notification panel can be integrated by an FACP via the ANN/ACS (EIA-485) link. Compatible FACPs include the MS-9200UDLS and MS-9600(UD)LS.

30. The Voice Evacuation/Mass Notification panel integrates with the MS-9200UDLS and MS-9600(UD)LS will report Mass Notification events to the Central Station.

31. The Voice Evacuation/Mass Notification panel can be interface with other UL Listed Fire Alarm Control Panels via activation of reverse polarity or by contact closure.

E. Enclosures:

1. The Voice Evacuation/Mass Notification panel shall be housed in a UL-listed cabinet suitable for surface mounting. The cabinet and front shall be corrosion protected and painted red via the powder coat method with manufacturer's standard finish.

2. The back box and door shall be constructed of steel with provisions for electrical conduit connections into the sides and top.

3. The door shall provide a key lock and shall provide for the viewing of all indicators.

F. Power Supply:

1. The main power supply for the Voice Evacuation/Mass Notification panel shall provide up to 7.5 amps of available power for the panel and peripheral devices.

2. Provisions will be made to allow the audio-visual power to be increased as required by adding modular expansion audio-visual power supplies.

3. The power supply shall provide an integral battery charger or may be used with an external battery and charger systems. Battery arrangement may be configured in the field.

4. The main power supply shall continuously monitor all field wires for earth ground conditions.

5. The main power supply shall operate on 120 VAC, 60 Hz or 240 VAC, 50 Hz, and shall provide all necessary power for the Voice Evacuation/Mass Notification panel.

G. BATTERIES:

1. Upon loss of Primary (AC) power to the Voice Evacuation/Mass Notification panel, the batteries shall have sufficient capacity to power the Voice Evacuation/Mass Notification panel for required standby time (24 or 60 hours) followed by 15 minutes of alarm.

2. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Smoke or Heat Detector Spacing:

1. Smooth ceiling spacing shall not exceed 30 feet (9 m).
2. Spacing of heat detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas, shall be determined according to Appendix A in NFPA 72.
3. Spacing of heat detectors shall be determined based on guidelines and recommendations in NFPA 72.

B. HVAC: Locate detectors not closer than 3 feet (1 m) from air-supply diffuser or return-air opening.

C. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of the duct.

D. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.

E. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.

F. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches (150 mm) below the ceiling.

G. Device Location-Indicating Lights: Locate in public space near the device they monitor.

H. FACP: Surface mount with tops of cabinets not more than 72 inches (1830 mm) above the finished floor.

I. Annunciator: Install with top of panel not more than 72 inches (1830 mm) above the finished floor.

3.2 WIRING INSTALLATION

A. Install wiring according to the following:

1. NECA 1.
2. TIA/EIA 568-A.

B. Wiring Method: Install wiring in metal raceway according to Division 16 Section "Raceways and Boxes."

1. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable.

C. Wiring Method:

1. Cables and raceways used for fire alarm circuits, and equipment control wiring associated with the fire alarm system, may not contain any other wire or cable.
2. Fire-Rated Cables: Use of 2-hour fire-rated fire alarm cables, NFPA 70 Types MI and CI, is not permitted.
3. Signaling Line Circuits: Power-limited fire alarm cables may be installed in the same cable or raceway as signaling line circuits.

D. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

E. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

F. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.

G. Risers: Install at least two vertical cable risers to serve the fire alarm system. Separate risers in close proximity to each other with a minimum 1-hour-rated wall, so the loss of one riser does not prevent the receipt or transmission of signals from other floors or zones.

H. Wiring to Remote Alarm Transmitting Device: 1-inch (25-mm) conduit between the FACP and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals according to Division 16 Section "Electrical Identification."

B. Install instructions frame in a location visible from the FACP.

C. Paint power-supply disconnect switch red and label "FIRE ALARM."

3.4 GROUNDING

A. Ground the FACP and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to the FACP.

3.5 FIELD QUALITY CONTROL

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

1. Before requesting final approval of the installation, submit a written statement using the form for Record of Completion shown in NFPA 72.
2. Perform each electrical test and visual and mechanical inspection listed in NFPA 72. Certify compliance with test parameters.
3. Visual Inspection: Conduct a visual inspection before any testing. Use as-built drawings and system documentation for the inspection. Identify improperly located, damaged, or nonfunctional equipment, and correct before beginning tests.
4. Testing: Follow procedure and record results complying with requirements in NFPA 72.

    a. Detectors that are outside their marked sensitivity range shall be replaced.

5. Test and Inspection Records: Prepare according to NFPA 72, including demonstration of sequences of operation by using the matrix-style form in Appendix A in NFPA 70.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the fire alarm system, appliances, and devices.

END OF SECTION

Project Manual

EXCERPT INCL:
DIVISION 31 EARTHWORK
DIVISION 32 EXTERIOR IMPROVEMENTS
DIVISION 33 UTILITIES

BID NUMBER – BID-SJR-06-2018

Renovation with Addition To Building V, St. Augustine Campus

2990 College Drive
St. Augustine, Florida 32084

TO BE CONSTRUCTED FOR:

ST. JOHNS RIVER STATE COLLEGE

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TECHNICAL PROVISIONS

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SECTION 31 10 00

SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
1. Protecting existing trees and vegetation to remain.
2. Removing trees and other vegetation as required.
3. Clearing and grubbing.
4. Topsoil stripping.
5. Removing above-grade site improvements as required.
6. Disconnecting, capping or sealing, and abandoning site utilities in place.
7. Disconnecting, capping or sealing, and removing site utilities.
8. Reinstalling above-grade site improvements where specified.
9. Reconnecting site utilities where specified.

B. Related Sections include the following:
1. Division 1 Section "Field Engineering" for verifying utility locations and for recording field measurements.
2. Division 1 Section "Construction Facilities and Temporary Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and environmental protection measures during site operations.
3. Division 1 Section "Temporary Tree and Plant Protection" for protecting trees remaining on-site that are affected by site operations.
4. Division 22 Section "Earth Moving" for soil materials, excavating, backfilling, and site grading.
5. Division 32 Sections for finish grading, including placing and preparing topsoil for lawns and planting.

1.3 DEFINITIONS

A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of weeds, roots, and other deleterious materials.

1.4 MATERIALS OWNERSHIP

A. Except for materials indicated to be stockpiled or to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from the site.

1.5 SUBMITTALS

A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

B. Record drawings according to Division 1 Section "Project Closeout."
1. Identify and accurately locate capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

A. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.7 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing indicated removal and alteration work on property adjoining Owner's property will be obtained by Owner before award of Contract.

C. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

D. Notify utility locator service for area where Project is located before site clearing.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 2 Section "Earthwork."
   1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Locate and clearly flag trees and vegetation to remain or to be relocated.

D. Protect existing site improvements to remain from damage during construction.
   1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TREE PROTECTION

A. Erect and maintain a temporary fence around drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete.
   1. Do not store construction materials, debris, or excavated material within drip line of remaining trees.
   2. Do not permit vehicles, equipment, or foot traffic within drip line of remaining trees.

B. Do not excavate within drip line of trees, unless otherwise indicated.

C. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
   1. Cover exposed roots with burlap and water regularly.
   2. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
   3. Coat cut faces of roots more than 1-1/2 inches in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
   4. Cover exposed roots with wet burlap to prevent roots from drying out. Backfill with soil as soon as possible.

D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.
   1. Employ a qualified arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.

2. Replace trees that cannot be repaired and restored to full-growth status, as determined by the qualified arborist.

3.3 UTILITIES

A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing when requested by Contractor.
   1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
   1. Owner will arrange to shut off indicated utilities when requested by Contractor.
   2. Arrange to shut off indicated utilities with utility companies.

C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify Architect not less than two days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Architect's written permission.

D. Excavate for and remove underground utilities indicated to be removed.

E. Removal of underground utilities is included in Division 23 mechanical or Division 26 electrical Sections.

3.4 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.
   1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
   2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
   3. Completely remove stumps, roots, obstructions, and debris extending to a depth of 18 inches below exposed sub-grade.
   4. Use only hand methods for grubbing within drip line of remaining trees.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
   1. Place fill material in horizontal layers not exceeding 8-inch loose depth, and compact each layer to a density equal to adjacent original ground.

3.5 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
   1. Strip surface soil of unsuitable topsoil, including trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   1. Limit height of topsoil stockpiles to 72 inches.
   2. Do not stockpile topsoil within drip line of remaining trees.
   3. Dispose of excess topsoil as specified for waste material disposal.
   4. Stockpile surplus topsoil and allow for re-spreading deeper topsoil.

3.6 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
   1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.

3.7 DISPOSAL

A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 31 20 00

EARTH MOVING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
1. Preparing sub-grades for slabs-on-grade, walks, pavements, lawns, and plantings.
2. Excavating and backfilling for buildings and structures.
3. Excavating and backfilling for stormwater basins and berms.
4. Excavating and backfilling for wetland restoration activities.
5. Sub-grade course for concrete walks and pavements.
6. Base course for asphalt paving.
7. Excavating and backfilling trenches within building lines.
8. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.

1.3 DEFINITIONS

A. Backfill: Soil materials used to fill an excavation.
1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Layer placed between the sub-grade course and asphalt paving.

C. Bedding Course: Layer placed over the excavated sub-grade in a trench before laying pipe.

D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

E. Excavation: Removal of material encountered above sub-grade elevations.
1. Additional Excavation: Excavation below sub-grade elevations as directed by Architect. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Bulk Excavation: Excavations more than 10’ (3 m) in width and pits more than 30’ (9 m) in either length or width.
3. Unauthorized Excavation: Excavation below sub-grade elevations or beyond indicated dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

F. Fill: Soil materials used to raise existing grades.

G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

H. Sub-grade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below sub-base, drainage fill, or topsoil materials.

I. Stabilized Sub-grade: Layer placed between the natural ground and base course for paving. Stabilized sub-grade shall be FDOT Type B.

J. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

A. Product Data: For the following:
   1. Each type of plastic warning tape.
   2. Drainage fabric.
   3. Separation fabric.

B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
   1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
   2. Laboratory compaction curve according to ASTM D 1557 for each on-site or borrow soil material proposed for fill and backfill.

1.5 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.

1.6 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify Architect not less than two days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Architect's written permission.
   3. Contact utility-locator service for area where Project is located before excavating.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols.
   1. Unsatisfactory soils also include satisfactory soils not maintained within 2% of optimum moisture content at time of compaction.

D. Backfill and Fill: Satisfactory soil materials.

E. Stabilized Sub-grade: Stabilized sub-grade per FDOT Standard Specifications for Type B.

F. Base: Limerock per FDOT Standard Specifications.

G. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2” (38-mm) sieve and not more than 12% passing a No. 200 (0.075-mm) sieve.

H. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100% passing a 1” (25-mm) sieve and not more than 8% passing a No. 200 (0.075-mm) sieve.

I. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100% passing a 1-1/2” (38-mm) sieve and 0 to 5% passing a No. 8 (2.36-mm) sieve.

J. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100% passing a 1" (25-mm) sieve and 0 to 5% passing a No. 4 (4.75-mm) sieve.

K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6" (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30" (750 mm) deep; colored as follows:
1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

B. Drainage Fabric: Nonwoven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:
1. Grab Tensile Strength: 110 lbf (490 N); ASTM D 4632.
2. Tear Strength: 40 lbf (178 N); ASTM D 4533.
3. Puncture Resistance: 50 lbf (222 N); ASTM D 4833.
4. Water Flow Rate: 150 gpm per sq. ft. (100 L/s per sq. m); ASTM D 4491.
5. Apparent Opening Size: No. 50 (0.3 mm); ASTM D 4751.

C. Separation Fabric: Woven geotextile, specifically manufactured for use as a separation geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:
1. Grab Tensile Strength: 200 lbf (890 N); ASTM D 4632.
2. Tear Strength: 75 lbf (333 N); ASTM D 4533.
3. Puncture Resistance: 90 lbf (400 N); ASTM D 4833.
4. Water Flow Rate: 4 gpm per sq. ft. (2.7 L/s per sq. m); ASTM D 4491.
5. Apparent Opening Size: No. 30 (0.6 mm); ASTM D 4751.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Protect sub-grades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

C. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared sub grades, and from flooding Project site and surrounding area.

B. Protect sub-grades from softening, undermining, washout, and damage by rain or water accumulation.
1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.
   1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1" (25 mm). Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
   1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
   2. Pile Foundations: Stop excavations from 6 to 12 inches (150 to 300 mm) above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
   3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1" (25 mm). Do not disturb bottom of excavations intended for bearing surface.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.
   1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12" (300 mm) higher than top of pipe or conduit, unless otherwise indicated.
   1. Clearance: 12" (300 mm) on each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape sub-grade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench sub-grade.
   1. For pipes and conduit less than 6" (150 mm) in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed sub-grade.
   2. For pipes and conduit 6" (150 mm) or larger in nominal diameter, shape bottom of trench to support bottom 90° of pipe circumference. Fill depressions with tamped sand backfill.
   3. Excavate trenches 6" (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.8 APPROVAL OF SUBGRADE

A. Notify Architect when excavations have reached required sub-grade.

B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
   1. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

C. Proof roll sub-grade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated sub-grades.

D. Reconstruct sub-grades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Architect.
   1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:
   1. Construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
   2. Surveying locations of underground utilities for record documents.
   3. Inspecting and testing underground utilities.
   4. Removing concrete formwork.
   5. Removing trash and debris.
   6. Removing temporary shoring and bracing, and sheeting.
   7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.12 UTILITY TRENCH BACKFILL

A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

B. Backfill trenches excavated under footings and within 18” (450 mm) of bottom of footings; fill with concrete to elevation of bottom of footings.

C. Provide 4” (100-mm-) thick, concrete-base slab support for piping or conduit less than 30” (750 mm) below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4” (100 mm) of concrete before backfilling or placing roadway sub-base.

D. Place and compact initial backfill of sub-base material, free of particles larger than 1” (25 mm), to a height of 12” (300 mm) over the utility pipe or conduit.
   1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.

E. Coordinate backfilling with utilities testing.

F. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.

G. Place and compact final backfill of satisfactory soil material to final subgrade.

H. Install warning tape directly above utilities, 12” (300 mm) below finished grade, except 6” (150 mm) below sub-grade under pavements and slabs.

3.13 FILL

A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.

B. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

C. Place and compact fill material in layers to required elevations as follows:
   1. Under grass and planted areas, use satisfactory soil material.

2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under building slabs, use engineered fill.
5. Under footings and foundations, use engineered fill.

3.14 MOISTURE CONTROL

A. Uniformly moisten or aerate sub-grade and each subsequent fill or backfill layer before compaction to within 2% of optimum moisture content.
   1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
   2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2% and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF BACKFILLS AND FILLS

A. Place backfill and fill materials in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil to not less than the following percentages of maximum density according to ASTM D 1557:
   1. Under structures, stormwater basin berms, building slabs, steps, and pavements, scarify and recompact top 12” (300 mm) of existing sub-grade and each layer of backfill or fill material at 98%.
   2. Under walkways, scarify and recompact top 6” (150 mm) below sub-grade and compact each layer of backfill or fill material at 98%.
   3. Under lawn or unpaved areas, scarify and recompact top 6” (150 mm) below sub-grade and compact each layer of backfill or fill material at 90%
   4. Stormwater basin berms: Compact each layer of backfill or fill material at 98%

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish sub grades to required elevations within the following tolerances:
   1. Lawn or Unpaved Areas: Plus or minus 1” (25 mm).
   2. Walks: Plus or minus 1” (25 mm).
   3. Pavements: Plus or minus ½” (13 mm).
   4. Stormwater basin bottoms: Minus 1”
   5. Stormwater basin berm tops: Plus 1”

C. Grading inside Building Lines: Finish sub-grade to a tolerance of ½” (13 mm) when tested with a 10’ (3-m) straightedge.

3.17 SUBSURFACE DRAINAGE

A. Drainage Piping: Drainage pipe is specified in Division 2 Section "Foundation Drainage Systems."

B. Subsurface Drain: Place a layer of drainage fabric around perimeter of drainage trench as indicated. Place a 6” (150-mm) course of filter material on drainage fabric to support drainage pipe. Encase drainage pipe in a minimum of 12” (300 mm) of filter material and wrap in drainage fabric, overlapping sides and ends at least 6” (150 mm).
   1. Compact each course of filter material to 95 percent of maximum dry unit weight according to ASTM D 698.

3.18 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified independent geotechnical engineering testing agency acceptable to Owner to perform field quality-control testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Footing Sub-grade: At footing sub-grades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing sub-grades may be based on a visual comparison of sub-grade with tested sub-grade when approved by Architect.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
   1. Paved and Building Slab Areas: At sub-grade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than three tests.
   2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for each 100’ (30 m) or less of wall length, but no fewer than two tests.
   3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 150’ (46 m) or less of trench length, but no fewer than two tests.
   4. Stormwater Basin Berms: At sub-grade and at each compacted backfill or fill layer, at least one test for every 50’ or less of berm length, but no fewer than two tests per berm section.

E. When testing agency reports that sub-grades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; re-compact and retest until specified compaction is obtained.

3.19 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
   1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and Re-compact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
   1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.20 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION

SECTION 31 31 16

TERMITE CONTROL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes the following: Soil treatment with termiticide.

1.3 PERFORMANCE REQUIREMENTS

A. Service Life of Soil Treatment: Soil treatment by use of a termiticide that is effective for not less than five years against infestation of subterranean termites.

1.4 SUBMITTALS

A. Product Data: For termiticide, include the EPA-registered Label for termiticide products.

B. Product Certificates: For termite control products, signed by product manufacturer.

C. Qualifications Data: For installer of termite control products.

D. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's record information, including the following:
1. Date and time of application
2. Moisture content of soil before application
3. Brand name and manufacturer of termiticide
4. Quantity of undiluted termiticide used
5. Dilutions, methods, volumes and rates of application used
6. Areas of application
7. Water source for application

E. Warranty: Special warranty specified in this section

F. Certificate of Compliance: The licensed pest control company shall issue a Certificate of Compliance to the authorities having jurisdiction stating the following: The building has received a complete treatment for the prevention of subterranean termites. Treatment is in accordance with rules and laws established by the Florida Department of Agriculture and Consumer Services.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Formulate and apply termiticides according to the EPA-Registered Label. Product listed as registered for use as a preventative treatment for termites for new construction by the Florida Department of Agriculture under authority of Chapter 487, Florida Statutes.

B. Source Limitations: Obtain termite control products through one source.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

1.7 COORDINATION

A. Coordinate soil treatment application with excavating, filling, grading and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor certifying that termite control work consisting of applied soil termiticide treatment will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
   1. Warranty Period: 1 year from date of Substantial Completion.

1.9 MAINTENANCE SERVICE

A. Continuing Service: Beginning at Substantial Completion, provide 12 months' continuing service including monitoring, inspection and re-treatment for occurrences of termite activity. Provide a standard continuing service agreement. State services, obligations, conditions and terms for agreement period and terms for future renewal options.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Termiticides:
      a. Aventis Environmental Science USA LP; Termidor
      b. Bayer Corporation; Premise 75
      c. Syngenta; Demon TC

2.2 NOTICE OF TERMITE PROTECTION

A. Provide a permanent sign which identifies the termite treatment provider and need for re-inspection and treatment contract renewal shall be provided. The sign shall be posted near the water heater or electrical panel.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content of soil, interfaces with earthwork, slab and foundation work, landscaping and other conditions affecting performance of termite control. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork and construction waste wood from soil within and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen rake and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION

A. Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

B. The licensed pest control service shall be Massey Services, Preventech Jacksonville, 11283 Old St. Augustine Road, Jacksonville, Florida 32257 Tel: 904-273-0203

3.4 APPLYING SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical barrier or treated zone is established around and under building construction. Distribute treatment evenly.

1. Slabs-on-Grade: Underground-supported slab construction, including footings, building slabs and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
2. Foundations: Adjacent soil including soil along the entire inside perimeter of foundation walls, along with both sides of interior partition walls, around plumbing pipes and electric conduit penetrating the slab and around interior column footers; also along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
3. Penetrations: At expansion joints, control joints and areas where slabs will be penetrated.

B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

D. Post warning signs in areas of application.

E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping or other construction activities following application.

END OF SECTION

SECTION 31 50 00

EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes excavation support and protection systems.

1.3 PERFORMANCE REQUIREMENTS

A. Design, provide, monitor, and maintain an anchored and braced excavation support and protection system capable of resisting soil and hydrostatic pressure and supporting sidewalls of excavations.
   1. Work includes removing excavation support and protection systems when no longer needed.
   2. Prevent surface water from entering excavations by grading, dikes, or other means.
   3. Install excavation support and protection systems without damaging existing buildings, pavements, and other improvements adjacent to excavation.

1.4 SUBMITTALS

A. Shop Drawings: Prepared by or under the supervision of a qualified professional engineer for excavation support and protection systems. System design and calculations must be acceptable to authorities having jurisdiction.
   1. Include Shop Drawings signed and sealed by the qualified professional engineer responsible for their preparation.

B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

C. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by excavation support and protection systems.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing excavation support and protection systems similar to those required for this Project and with a record of successful in-service performance.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where the Project is located and who is experienced in providing engineering services for designing excavation support and protection systems that are similar to those indicated for this Project in material, design, and extent.
   1. Engineering Responsibility: Engage a qualified professional engineer to prepare or supervise the preparation of data for the excavation support and protection system including drawings and comprehensive engineering analysis that shows the system's compliance with specified requirements.

1.6 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by the Owner or others unless permitted in writing by the Architect and then only after arranging to provide temporary utility services according to requirements indicated.

B. Project Site Information: A geotechnical report has been prepared for this Project and is available for information only. The report is not part of the Contract Documents. The opinions expressed in this report are those of the geotechnical engineer and represent interpretations of the subsoil conditions,

tests, and results of analyses conducted by the geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from this data by Contractor.

1. Make additional test borings and conduct other exploratory operations as necessary.
2. The geotechnical report is included elsewhere in the Project Manual.
3. The geotechnical report is referenced elsewhere in the Project Manual.

C. Survey adjacent structures and improvements, employing a qualified professional engineer or surveyor; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

1. During installation of excavation support and protection systems, regularly resurvey bench marks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Materials need not be new but must be in serviceable condition.

B. Structural Steel: ASTM A 36.

C. Steel Sheet Piling: ASTM A 328 or ASTM A 572.

D. Wood Lagging: Lumber, mixed hardwood, nominal rough thickness of 3 inches .

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.

1. Shore, support, and protect utilities encountered.

B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

C. Locate excavation support and protection systems clear of permanent construction and to permit forming and finishing of concrete surfaces.

D. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to en sure excavation support and protection systems remain stable.

E. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

3.2 SOLDIER BEAMS AND LAGGING

A. Install steel soldier piles before stating excavation. Space soldier piles at intervals indicated. Accurately align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.

B. Install wood lagging within flanges of soldier piles as excavation proceeds. Trim excavation as required to install lagging. Fill voids behind lagging with soil, and compact.

C. Install wales horizontally at centers indicated and secure to soldier piles.

3.3 SHEET PILING

A. Install one-piece sheet piling and tightly interlock to form a continuous barrier. Accurately align exposed faces of sheet piling to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment. Cut tops of sheet piling to uniform elevation at top of excavation.

3.4 TIEBACKS

A. Tiebacks: Drill for, install, tension, and grout tiebacks into position. Test load-carrying capacity of each tieback and replace and retest deficient tiebacks.

3.5 BRACING

A. Bracing: Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move a brace, install new bracing before removing original brace.
   1. Do not place bracing where it will be cast into or included in permanent concrete work, unless otherwise approved by Architect.
   2. Install internal bracing, if required, to prevent spreading or distortion of braced frames.
   3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.6 REMOVAL AND REPAIRS

A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils and damaging structures, pavements, facilities, and utilities.
   1. Remove excavation support and protection systems to a minimum depth of 48” below overlying construction and abandon remainder.
   2. Repair or replace, as approved by Architect, adjacent work damaged or displaced by removing excavation support and protection systems.

B. Leave excavation support and protection systems permanently in place.

END OF SECTION

SECTION 32 13 13

CONCRETE PAVING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:
1. Driveways and roadways.
2. Parking lots.
3. Curbs and gutters.
4. Walkways.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

1.4 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Design Mixes: For each concrete pavement mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

C. Samples: 10-lb (4.5-kg) sample of exposed aggregate.

D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

E. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:
1. Cementitious materials and aggregates.
2. Steel reinforcement and reinforcement accessories.
3. Fiber reinforcement.
4. Admixtures.
5. Curing compounds.
6. Applied finish materials.
7. Bonding agent or adhesive.
8. Joint fillers

F. Minutes of pre-installation conference.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed pavement work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
1. Manufacturer must be certified according to the National Ready Mix Concrete Association's Plant Certification Program.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.

E. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.

F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixes.

G. Mockups: Cast mockups of full-size sections of concrete pavement to demonstrate typical joints, surface finish, texture, color, and standard of workmanship.
   1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
   2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
   3. Obtain Architect's approval of mockups before starting construction.
   4. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed pavement.
   5. Demolish and remove approved mockups from the site when directed by Architect.
   6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

H. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."
   1. Before submitting design mixes, review concrete pavement mix design and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with concrete pavement to attend, including the following:
      a. Contractor's superintendent.
      b. Independent testing agency responsible for concrete design mixes.
      c. Ready-mix concrete producer.
      d. Concrete subcontractor.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
   1. Use flexible or curved forms for curves of a radius 100 feet (30.5 m) or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

B. Deformed-Steel Welded Wire Fabric: ASTM A 497, flat sheet.

C. Epoxy-Coated Welded Wire Fabric: ASTM A 884/A 884M, Class A, plain steel.

D. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

E. Epoxy-Coated Reinforcement Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars.

F. Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars; assembled with clips.

G. Plain Steel Wire: ASTM A 82, as drawn.

H. Epoxy-Coated Wire: ASTM A 884/A 884M, Class A coated, plain steel.

I. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60 (Grade 420). Cut bars true to length with ends square and free of burrs.

J. Epoxy-Coated Joint Dowel Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60 (Grade 420), plain steel bars.

K. Tie Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

L. Hook Bolts: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), internally and externally threaded. Design hook-bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.

M. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:
1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer coated wire bar supports.

N. Epoxy Repair Coating: Liquid two-part epoxy repair coating, compatible with epoxy coating on reinforcement.

2.3 CONCRETE MATERIALS

A. General: Use the same brand and type of cementitious material from the same manufacturer throughout the Project.

B. Portland Cement: ASTM C 150, Type I or II.
1. Fly Ash: ASTM C 618, Class F or C.
2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

C. Blended Hydraulic Cement: ASTM C 595M, Type IS, portland blast-furnace slag cement.

D. Blended Hydraulic Cement: ASTM C 595M, Type IP portland pozzolan cement.

E. Blended Hydraulic Cement: ASTM C 595M, Type I (PM) pozzolan-modified portland cement.

F. Blended Hydraulic Cement: ASTM C 595M, Type I (SM) slag-modified portland cement.

G. Aggregate: ASTM C 33, uniformly graded, from a single source, with coarse aggregate as follows:
1. Class: 4S.
2. Maximum Aggregate Size: 1 inch (25 mm) nominal.
3. Do not use fine or coarse aggregates containing substances that cause spalling.

H. Exposed Aggregate: Selected, hard, and durable; washed; free of material that reacts with cementitious material or causes staining; from a single source, with gap graded coarse aggregate as follows:
1. Aggregate Sizes: 3/8 to 5/8 inch (10 to 16 mm) nominal.

I. Water: ASTM C 94.

2.4 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain not more than 0.1% water-soluble chloride ions by mass of cement and to be compatible with other admixtures.

B. Air-Entraining Admixture: ASTM C 260.

C. Water-Reducing Admixture: ASTM C 494, Type A.

D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

F. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

2.5 FIBER REINFORCEMENT

A. Synthetic Fiber: Fibrillated polypropylene fibers engineered and designed for use in concrete pavement, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches (13 to 38 mm) long.

B. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

C. Products: Subject to compliance with requirements, provide one of the following:
1. Fibrillated Fibers:
a. Fibrasol F; Axim Concrete Technologies.
b. Fibermesh; Fibermesh, Div. of Synthetic Technologies.
c. Forta; Forta Corporation.
d. Grace Fibers; W. R. Grace & Co., Construction Products Div.

2.6 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

E. Clear Solvent-Borne Liquid-Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

F. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

G. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.

H. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

I. Products: Subject to compliance with requirements, provide one of the following:
1. Evaporation Retarder:
a. Cimfilm; Axim Concrete Technologies.
b. Finishing Aid Concentrate; Burke Group, LLC (The).
c. Spray-Film; ChemMasters.
d. Aquafilm; Conspec Marketing & Manufacturing Co., Inc.
e. Sure Film; Dayton Superior Corporation.
f. Eucobar; Euclid Chemical Co.
g. Vapor Aid; Kaufman Products, Inc.
h. Lambco Skin; Lambert Corporation.
i. E-Con; L&M Construction Chemicals, Inc.
j. Confilm; Master Builders, Inc.
k. Waterhold; Metalcrete Industries.
l. Rich Film; Richmond Screw Anchor Co.
m. SikaFilm; Sika Corporation.
n. Finishing Aid; Symons Corporation.
o. Certi-Vex EnvioAssist; Vexcon Chemicals, Inc.
2. Clear Solvent-Borne Liquid-Membrane-Forming Curing Compound:
a. AH Curing Compound #2 DR; Anti-Hydro International, Inc.
b. Res-X Cure All Resin; Burke Group, LLC (The).
c. RX Cure; Conspec Marketing & Manufacturing Co., Inc.
d. Day-Chem Rez Cure; Dayton Superior Corporation.
e. Kurez DR; Euclid Chemical Co.
f. Nitocure S; Fosroc.
g. #64 Resin Cure; Lambert Corporation.

h. L&M Cure DR; L&M Construction Chemicals, Inc.
i. 3100-Clear; W. R. Meadows, Inc.
j. Seal N Kure FDR; Metalcrete Industries.
k. Rich Cure; Richmond Screw Anchor Co.
l. Resi-Chem C309; Symons Corporation.
m. Horncure 30; Tamms Industries Co., Div. of LaPorte Construction Chemicals North America, Inc.
n. Uni Res 150; Unitex.
o. Certi-Vex RC; Vexcon Chemicals, Inc.

3. Clear Waterborne Membrane-Forming Curing Compound:
   a. AH Curing Compound #2 DR WB; Anti-Hydro International, Inc.
   b. Aqua Resin Cure; Burke Group, LLC (The).
   c. Safe-Cure Clear; ChemMasters.
   d. W.B. Resin Cure; Conspec Marketing & Manufacturing Co., Inc.
   e. Day Chem Rez Cure (J-11-W); Dayton Superior Corporation.
   f. Nitocure S; Fosroc.
   g. Aqua Kure-Clear; Lambert Corporation.
   h. L&M Cure R; L&M Construction Chemicals, Inc.
   i. 1100 Clear; W. R. Meadows, Inc.
   j. Resin Cure E; Nox-Crete Products Group, Kinsman Corporation.
   k. Rich Cure E; Richmond Screw Anchor Co.
   l. Resi-Chem Clear Cure; Symons Corporation.
   m. Horncure 100; Tamms Industries Co., Div. of LaPorte Construction Chemicals North America, Inc.
   n. Hydro Cure; Unitex.
   o. Certi-Vex Enviocure; Vexcon Chemicals, Inc.
4. White Waterborne Membrane-Forming Curing Compound:
   a. AH Curing Compound #2 WB WP; Anti-Hydro International, Inc.
   b. Aqua Resin Cure; Burke Group, LLC (The).
   c. W.B. Resin Cure; Conspec Marketing & Manufacturing Co., Inc.
   d. Thinfilm 450; Kaufman Products, Inc.
   e. Aqua Kure-White; Lambert Corporation.
   f. L&M Cure R-2; L&M Construction Chemicals, Inc.
   g. 1200-White; W. R. Meadows, Inc.
   h. White Pigmented Resin Cure E; Nox-Crete Products Group, Kinsman Corporation.
   i. Rich Cure White E; Richmond Screw Anchor Co.
   j. Resi-Chem High Cure; Symons Corporation.
   k. Horncure 200-W; Tamms Industries Co., Div. of LaPorte Construction Chemicals North America, Inc.
   l. Hydro White 309; Unitex.

2.7 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

B. Pavement-Marking Paint: Alkyd-resin type; ready mixed; complying with FS TT-P-115, Type I, or AASHTO M 248, Type N.
   1. Color: Blue for handicapped requirements, white elsewhere.

C. Glass Beads: AASHTO M 247.

D. Wheel Stops: Precast, air-entrained concrete; 2500-psi (17.2-MPa) minimum compressive strength; approximately 6” (150 mm) high, 9” (225 mm) wide, and 84” (2130 mm) long. Provide chamfered corners and drainage slots on underside, and provide holes for dowel-anchoring to substrate.
   1. Dowels: Galvanized steel, diameter of ¾” (19 mm), minimum length 10” (254 mm).

E. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery with emery aggregate containing not less than 50% aluminum oxide and not less than 25% ferric oxide; unaffected by freezing, moisture, and cleaning materials.

F. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

G. Rock Salt: Sodium chloride crystals, kiln dried, coarse gradation with 100% passing 3/8" (9.5-mm) sieve and 85% retained on a No. 8 (2.36-mm) sieve.

H. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:
1. Type II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.
2. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
3. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

I. Chemical Surface Retarder: Water-soluble, liquid set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch (3 to 6 mm).

J. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
1. Chemical Surface Retarder:
   a. True Etch Surface Retarder; Burke Group, LLC (The).
   b. Exposee; ChemMasters.
   c. Delay S; Conspec Marketing & Manufacturing Co., Inc.
   d. Concrete Surface Retarders; Euclid Chemical Co.
   e. Expose; Kaufman Products, Inc.
   f. Surftard; Metalcrete Industries.
   g. Crete-Nox TA; Nox-Crete Products Group, Kinsman Corporation.
   h. Lithotex; L. M. Scofield Co.
   i. Rugasol-S; Sika Corporation.
   j. Certi-Vex Envioset; Vexcon Chemicals, Inc.
2. Colored Dry-Shake Hardener:
   a. Conshake 600 Colortone; Conspec Marketing & Manufacturing Co., Inc.
   b. Quartz Tuff; Dayton Superior Corporation.
   c. Surflex; Euclid Chemical Co.
   d. Colorhard; Lambert Corporation.
   e. Quartz Plate; L&M Construction Chemicals, Inc.
   f. Colorcron; Master Builders, Inc.
   g. Floor Quartz; Metalcrete Industries.
   h. Richmond Hard Top; Richmond Screw Anchor Co.
   i. Lithochrome Color Hardener; L. M. Scofield Co.
   j. Harcol; Sonneborn, Div. of ChemRex, Inc.
   k. Hard Top; Symons Corporation.

2.8 CONCRETE MIXES

A. Prepare design mixes, proportioned according to ACI 211.1 and ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.

B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the trial batch method.
1. Do not use Owner's field quality-control testing agency as the independent testing agency.

C. Proportion mixes to provide concrete with the following properties:
1. Compressive Strength (28 Days): 3000 psi (20.7 MPa).
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Slump Limit: 3 inches (75 mm).
   a. Slump Limit for Concrete Containing High-Range Water-Reducing Admixture: Not more than 8" (200 mm) after adding admixture to plant- or site-verified, 2- to 3-inch (50- to 75-mm) slump.

D. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals.

E. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
1. Combined Fly Ash and Pozzolan: 25%

F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 2.5 to 4.5 percent.

G. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd. (0.60 kg/cu. m).

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94.

B. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94 and ASTM C 1116.
1. When air temperature is between 85°F (30°C) and 90°F (32°C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90°F (32°C), reduce mixing and delivery time to 60 minutes.

C. Project-Site Mixing: Comply with requirements and measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
1. For mixers of 1 cu. yd. (0.76 cu. m) or smaller capacity, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
2. For mixers of capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 PREPARATION

A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Proceed with pavement only after nonconforming conditions have been corrected and sub-grade is ready to receive pavement.

B. Remove loose material from compacted subbase surface immediately before placing concrete.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating reinforcement and with recommendations in CRSI's "Placing Reinforcing Bars" for placing and supporting reinforcement.
1. Apply epoxy repair coating to uncoated or damaged surfaces of epoxy-coated reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch (50-mm) overlap to adjacent mats.

3.4 JOINTS

A. General: Construct construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to center line, unless otherwise indicated.
   1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour, unless pavement terminates at isolation joints.
   1. Provide preformed galvanized steel or plastic keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
   2. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
   3. Provide tie bars at sides of pavement strips where indicated.
   4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
   5. Use epoxy bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
   1. Locate expansion joints at intervals of 50 feet (15.25 m), unless otherwise indicated.
   2. Extend joint fillers full width and depth of joint.
   3. Terminate joint filler less than 1/2 inch (12 mm) or more than 1 inch (25 mm) below finished surface if joint sealant is indicated.
   4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
   5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
   6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

E. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
   1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to the following radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
      a. Radius: 1/4 inch (6 mm).
   2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random con traction cracks.

F. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to the following radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.
   1. Radius: 1/4 inch (6 mm).

3.5 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcement steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from sub-base surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten sub-base to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

D. Comply with requirements and with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery, at Project site, or during placement.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.
   1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

H. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.
   1. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer, or use bonding agent if approved by Architect.

I. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading dry-shake surface treatments.

J. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.

K. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix de sign and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.
   1. Compact sub-base and prepare sub-grade of sufficient width to prevent displacement of paver machine during operations.

L. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

M. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures. When air temperature has fallen to or is expected to fall below 40°F (4.4°C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50°F (10°C) and not more than 80°F (27°C) at point of placement.

N. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows when hot-weather conditions exist:
   1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90°F (32°C). Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
   2. Cover reinforcement steel with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
   3. Fog-spray forms, reinforcement steel, and subgrade just before placing concrete. Keep Sub-grade moisture uniform without standing water, soft spots, or dry areas.

3.6 CONCRETE FINISHING

A. General: Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots, and fill low spots. Refloat surface immediately to uniform granular texture.
   1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
   2. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
   3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch (1.6 to 3 mm) deep with a stiff-bristled broom, perpendicular to line of traffic.

3.7 SPECIAL FINISHES

A. Monolithic Exposed Aggregate Finish: Expose coarse aggregate to pavement surfaces as follows:
   1. Immediately after floating, spray-apply chemical surface retarder to pavement according to manufacturer's written instructions.
   2. Cover with plastic sheeting, sealing laps with tape, and remove when ready to continue finishing operations.
   3. Without dislodging aggregate, remove excess mortar by lightly brushing surface with a stiff, nylon bristle broom.
   4. Fine-spray surface with water and brush. Repeat water flushing and brushing cycle until cement film is removed from aggregate surfaces to depth required.

B. Seeded Exposed Aggregate Finish: Immediately after floating, broadcast a single layer of aggregate uniformly onto the pavement surface. Tamp seeded aggregate into plastic concrete, and float to entirely embed aggregate with mortar cover of 1/16 inch (1.6 mm).
   1. Spray-apply chemical surface retarder to pavement according to manufacturer's written instructions.
   2. Cover pavement surface with plastic sheeting, sealing laps with tape, and remove when ready to continue finishing operations.
   3. Without dislodging aggregate, remove excess mortar by lightly brushing surface with a stiff, nylon bristle broom.
   4. Fine-spray surface with water and brush. Repeat water flushing and brushing cycle until cement film is removed from aggregate surfaces to depth required.

C. Slip-Resistant Aggregate Finish: Before final floating, apply slip-resistant aggregate finish to pavement surfaces according to manufacturer's written instructions and as follows:
   1. Uniformly spread 25 lb/100 sq. ft. (12 kg/10 sq. m) of dampened nonslip aggregate over the surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface.
   2. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose nonslip aggregate.

D. Rock-Salt Finish: After initial floating, uniformly seed 5 lb/100 sq. ft. (0.2 kg/10 sq. m) over the concrete surface.
   1. Cover surface with 1-mil- (0.025-mm-) thick polyethylene sheet and remove when concrete has hardened and seven-day curing period has elapsed.
   2. Embed rock salt into plastic concrete, power float concrete, and trowel finish.
   3. After seven-day curing period, saturate concrete with water and broom-sweep surface to dissolve remaining rock salt.

E. Colored Dry-Shake Hardener Finish: After initial floating, apply colored dry-shake materials to pavement surfaces according to manufacturer's written instructions and as follows:
   1. Uniformly apply colored dry-shake materials at a rate of 100 lb/100 sq. ft. (49 kg/10 sq. m), unless greater amount is recommended by manufacturer to match pavement color required.
   2. Uniformly distribute approximately two-thirds of colored dry-shake material over the concrete surface with mechanical spreader, and embed by power floating. Follow power floating with a second shake application, uniformly distributing remainder of dry-shake material to ensure uniform color, and embed by power floating.
   3. After final floating, apply a hand-trowel finish followed by a broom finish to concrete. Cure concrete with curing compound recommended by dry-shake material manufacturer. Apply curing compound immediately after final finishing.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and follow recommendations in ACI 305R for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
   1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
      a. Water.
      b. Continuous water-fog spray.
      c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12” (300-mm) lap over adjacent absorptive covers.
   2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12” (300 mm), and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
   3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.9 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:
   1. Elevation: ¼” (6 mm).
   2. Thickness: Plus 3/8” (9 mm), minus ¼” (6 mm).
   3. Surface: Gap below 10’ (3-m-) long, unleveled straightedge not to exceed ¼” (6 mm).
   4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1” (25 mm).
   5. Vertical Alignment of Tie Bars and Dowels: ¼” (6 mm).
   6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: ½” (13 mm).
   7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel ¼” per 12” (6 mm per 300 mm).
   8. Joint Spacing: 3” (75 mm).
   9. Contraction Joint Depth: Plus ¼” (6 mm), no minus.
   10. Joint Width: Plus 1/8” (3 mm), no minus.

3.10 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow concrete pavement to cure for 28 days and be dry before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils (0.4 mm).
   1. Broadcast glass spheres uniformly into wet pavement markings at a rate of 6 lb/gal. (0.72 kg/L).

3.11 WHEEL STOPS

A. Securely attach wheel stops into pavement with not less than two galvanized steel dowels embedded in holes cast into wheel stops. Firmly bond each dowel to wheel stop and to pavement. Extend upper portion of dowel 5” (125 mm) into wheel stop and lower portion a minimum of 5” (125 mm) into pavement.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.

B. Testing Agency: Owner will engage a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.

C. Testing Services: Testing shall be performed according to the following requirements:
   1. Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C 172, except modified for slump to comply with ASTM C 94.
   2. Slump: ASTM C 143; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
   3. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air-entrained concrete.
   4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40°F (4.4°C) and below and when 80°F (27°C) and above, and one test for each set of compressive-strength specimens.
   5. Compression Test Specimens: ASTM C 31/C 31M; one set of four standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.
   6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m). One specimen shall be tested at 7 days and two specimens at 28 days; one specimen shall be retained in reserve for later testing if required.
   7. When frequency of testing will provide fewer than five compressive-strength tests for a given class of concrete, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
   8. When total quantity of a given class of concrete is less than 50 cu. yd. (38 cu. m), Architect may waive compressive-strength testing if adequate evidence of satisfactory strength is provided.
   9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, current operations shall be evaluated and corrective procedures shall be provided for protecting and curing in-place concrete.
   10. Strength level of concrete will be considered satisfactory if averages of sets of 3 consecutive compressive-strength test results equal or exceed specified compressive strength and no individual compressive-strength test result falls below specified compressive strength by more than 500 psi (3.4 MPa).

D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as the sole basis for approval or rejection.

F. Additional Tests: Testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3.13 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.

B. Drill test cores where directed by Architect when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 33 05 00

COMMON WORK RESULTS FOR UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following utility materials and methods to complement other utilities work:
1. Piping materials and installation instructions common to most piping systems.
2. Concrete base construction requirements.
3. Equipment nameplate data requirements.
4. Non-shrink grout for equipment installations.
5. Field-fabricated metal and wood equipment supports.
6. Utility piping demolition.
7. Cutting and patching.
8. Touchup painting and finishing.

1.3 DEFINITIONS

A. Exposed Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions.

B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

C. The following are industry abbreviations for plastic materials:
1. ABS: Acrylonitrile-butadiene-styrene.
2. CPVC: Chlorinated polyvinyl chloride.
3. PE: Polyethylene.
4. PVC: Polyvinyl chloride.

1.4 SUBMITTALS

A. Product Data: For identification materials and devices.

B. Samples of color, lettering style, and other graphic representation required for each identification material and device.

C. Shop Drawings: Detail fabrication and installation for metal and wood supports, and anchorage for utility piping materials and equipment.

D. Coordination Drawings: Detail major elements, components, and systems of utility equipment and materials in relation to other systems, installations, and building components. Show space requirements for installation and access. Indicate whether sequence and coordination of installations are important to efficient flow of the Work. Include the following:
1. Planned piping layout, including valve and specialty locations and valve-stem movement.
2. Clearances for installing and maintaining insulation.
3. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.
4. Equipment and accessory service connections and support details.
5. Building, exterior wall, and foundation penetrations.
6. Sizes and location of required concrete bases.
7. Scheduling, sequencing, movement, and positioning of large equipment during construction.
8. Floor plans, elevations, and details to indicate penetrations in floors and walls, and their relationship to other penetrations and installations.

E. Welding Certificates: Copies of certificates indicating compliance of welding procedures and personnel with requirements specified in the "Quality Assurance" Article of this Section.

1.5 QUALITY ASSURANCE

A. Qualify welding processes and operators for structural steel according to AWS D1.1, "Structural Welding Code--Steel."

B. Qualify welding processes and operators for piping according to the ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
1. Comply with provisions of ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

D. Equipment Selection: Equipment of greater or larger power, dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. If larger equipment is approved, no additional costs will be approved for these increases. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design requirements and commissioning requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and entrance of dirt, debris, and moisture.

B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.

C. Protect flanges, fittings, and piping specialties from moisture and dirt.

D. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate equipment installation with other components.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Sequence, coordinate, and integrate installations of materials and equipment for efficient flow of the Work.

D. Coordinate connection of piping systems with other exterior underground and overhead utilities and services. Comply with requirements of authorities having jurisdiction, franchised service companies, and controlling agencies.

E. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces.

PART 2 - PRODUCTS

2.1 PIPE AND PIPE FITTINGS

A. Refer to individual Division 22 Sections for pipe and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

A. Refer to individual Division 2 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
   1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness, unless otherwise indicated.
      a. Full-Face Type: For flat-face, Class 125 cast-iron and cast-bronze flanges.
      b. Narrow-Face Type: For raised-face, Class 250 cast-iron and steel flanges.
   2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metal: ASTM B 32.
   1. Alloy Sn95 or Alloy Sn94: Approximately 95% tin and 5% silver, with 0.10% lead content.
   2. Alloy E: Approximately 95% tin and 5% copper, with 0.10% maximum lead content.
   3. Alloy HA: Tin-antimony-silver-copper zinc, with 0.10% maximum lead content.
   4. Alloy HB: Tin-antimony-silver-copper nickel, with 0.10% maximum lead content.
   5. Alloy Sb5: 95% tin and 5% antimony, with 0.20% maximum lead content.

F. Brazing Filler Metals: AWS A5.8.
   1. BCuP Series: Copper-phosphorus alloys.
   2. BAg1: Silver alloy.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Solvent Cements: Manufacturer's standard solvent cements for the following:
   1. ABS Plastic Piping: ASTM D 2235.
   2. CPVC Plastic Piping: ASTM F 493.
   3. PVC Plastic Piping: ASTM D 2564. Include primer according to ASTM F 656.
   4. ABS to PVC Plastic Piping Transition: ASTM D 3138.

I. Plastic Pipe Seals: ASTM F 477, elastomeric gasket.

J. Flanged, Ductile-Iron-Pipe Gaskets, Bolts, and Nuts: AWWA C110, rubber gasket, carbon-steel bolts and nuts.

K. Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.
   1. Sleeve: ASTM A 126, Class B, gray iron.
   2. Followers: ASTM A 47 malleable iron or ASTM A 536 ductile iron.
   3. Gaskets: Rubber.
   4. Bolts and Nuts: AWWA C111.
   5. Finish: Enamel paint.

2.3 PIPING SPECIALTIES

A. Dielectric Fittings: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and to stop corrosion.
   1. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld neck end types; and matching piping system materials.
   2. Insulating Material: Suitable for system fluid, pressure, and temperature.
   3. Dielectric Unions: Factory-fabricated union assembly, for 250-psig minimum working pressure at 180°F.
   4. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig min imum working pressure as required to suit system pressures.
   5. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly; full-face or ring type. Components include neoprene or phenolic gasket, phenolic or PE bolt sleeves, phe nolic washers, and steel backing washers.
      a. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig minimum working pressure as required to suit system pressures.
   5. Dielectric Couplings: Galvanized-steel coupling; with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225°F.
   6. Dielectric Nipples: Electroplated steel nipple; with inert and noncorrosive, thermoplastic

lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225° F.

B. Mechanical sleeve seals for pipe penetrations through exterior building walls are specified in Division 15 Section "Basic Mechanical Materials and Methods."

C. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:
1. Steel Sheet Metal: 0.0239-inch minimum thickness, galvanized, round tube closed with welded longitudinal joint.
2. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.
3. Cast Iron: Cast or fabricated wall pipe equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.
4. PVC Plastic: Manufactured, permanent, with nailing flange for attaching to wooden forms.
5. PVC Plastic Pipe: ASTM D 1785, Schedule 40.
6. PE Plastic: Manufactured, reusable, tapered, cup-shaped, smooth outer surface; with nailing flange for attaching to wooden forms.

2.4 IDENTIFYING DEVICES AND LABELS

A. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 2 Sections. If more than one type is specified for application, selection is Installer's option, but provide one selection for each product category.

B. Equipment Nameplates: Metal nameplate with operational data engraved or stamped; permanently fastened to equipment.
1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data.
2. Location: An accessible and visible location.

C. Stencils: Standard stencils, prepared for required applications with letter sizes complying with recommendations of ASME A13.1 for piping and similar applications, but at least 1-1/4-inch- high letters for ductwork and at least 3/4-inch-high letters for access door signs and similar operational instructions.
1. Material: Fiberboard.
2. Material: Brass.
3. Stencil Paint: Standard exterior-type stenciling enamel; black, unless otherwise indicated; either brushing grade or pressurized spray-can form and grade.
4. Identification Paint: Standard identification enamel of colors indicated or, if not otherwise in dicated for piping systems, comply with ASME A13.1 for colors.

D. Snap-On Plastic Pipe Markers: Manufacturer's standard preprinted, semi-rigid, snap on, color-coded, complying with ASME A13.1.

E. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, permanent-adhesive, color-coded, pressure-sensitive vinyl, complying with ASME A13.1.

F. Plastic Duct Markers: Manufacturer's standard color-coded laminated plastic. Comply with the following color-codes:
1. Green: Cold air.
2. Yellow: Hot air.
3. Yellow/Green or Green: Supply air.
4. Blue: Exhaust, outside, return, and mixed air.
5. For hazardous exhausts, use colors and designs recommended by ASME A13.1.
6. Nomenclature: Include the following:
   a. Direction of airflow.
   b. Duct service.
   c. Duct origin.
   d. Duct destination.
   e. Design cubic feet/minute.

G. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated.
1. Fabricate in sizes required for message.
2. Engraved with engraver's standard letter style, of sizes and with wording to match equipment identification.

3. Punch for mechanical fastening.
4. Thickness: 1/16 inch, unless otherwise indicated.
5. Thickness: 1/8 inch, unless otherwise indicated.
6. Thickness: 1/16 inch, for units up to 20 sq. in. or 8 inches long; 1/8 inch for larger units.
7. Fasteners: Self-tapping stainless-steel screws or contact-type permanent adhesive.

H. Plastic Equipment Markers: Color-coded laminated plastic. Comply with the following color-codes:
1. Green: Cooling equipment and components.
2. Yellow: Heating equipment and components.
3. Yellow/Green: Combination cooling and heating equipment and components.
4. Brown: Energy reclamation equipment and components.
5. Blue: Equipment and components that do not meet any criteria above.
6. For hazardous equipment, use colors and designs recommended by ASME A13.1.
7. Nomenclature: Include the following, matching terminology on schedules as closely as possible:
   a. Name and plan number.
   b. Equipment service.
   c. Design capacity.
   d. Other design parameters such as pressure drop, entering and leaving conditions, and revolutions/minute.
8. Size: Approximate 2-1/2 by 4 inches for control devices, dampers, and valves; and 4-1/2 by 6 inches for equipment.

I. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification with corresponding designations indicated. Use numbers, lettering, and wording indicated for proper identification and operation/maintenance of mechanical systems and equipment.
1. Multiple Systems: If multiple systems of same generic name are indicated, provide identification that indicates individual system number and service.

2.5 GROUT

A. Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.
1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout; nonstaining; noncorrosive; nongaseous; and recommended for interior and exterior applications.
2. Design Mix: 5000 psig, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. General: Install piping as described below, unless piping Sections specify otherwise. Individual Division 2 piping Sections specify unique piping installation requirements.

B. General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.

C. Install piping at indicated slopes.

D. Install components with pressure rating equal to or greater than system operating pressure.

E. Install piping free of sags and bends.

F. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.

G. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

H. Install fittings for changes in direction and branch connections.

I. Install couplings according to manufacturer's written instructions.

J. Sleeves are not required for core drilled holes.

K. Permanent sleeves are not required for holes formed by PE plastic removable sleeves.

L. Verify final equipment locations for roughing-in.

M. Refer to equipment specifications in other Division 2 Sections for roughing-in requirements.

N. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping Sections:
1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
2. Remove scale, slag, dirt, and debris from inside and outside pipe and fittings before assembly.
3. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube"; or CDA's "Copper Tube Handbook."
4. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube."
5. Soldered Joints: Construct joints according to CDA's "Copper Tube Handbook."
6. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
7. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   a. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
   b. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
   c. Align threads at point of assembly.
   d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
   e. Damaged Threads: Do not use pipe or pipe fittings with corroded or damaged threads. Do not use pipe sections that have cracked or open welds.
8. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.
9. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.
10. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join pipe and fittings according to the following:
    a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
    b. ABS Plastic Piping: ASTM D 2235 and ASTM D 2661.
    c. CPVC Plastic Piping: ASTM D 2846 and ASTM F 493.
    d. PVC Plastic, Pressure Piping: ASTM D 2672.
    e. PVC Plastic, Nonpressure Piping: ASTM D 2855.
    f. ABS to PVC Plastic, Nonpressure Transition Fittings: Procedure and solvent cement according to ASTM D 3138.
11. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657 procedures and manufacturer's written instructions.
    a. Plain-End Pipe and Fittings: Use butt fusion.
    b. Plain-End Pipe and Socket Fittings: Use socket fusion.

O. Piping Connections: Make connections according to the following, unless otherwise indicated:
1. Install unions, in piping 2-inch NPS and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS or smaller threaded pipe connection.
2. Install flanges, in piping 2-1/2-inch NPS and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Architect.

B. Install equipment level and plumb.

C. Install equipment to facilitate service, maintenance, and repair or replacement of equipment components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.

D. Install equipment giving right of way to piping systems installed at required slope.

3.3 LABELING AND IDENTIFYING

A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
   1. Stenciled Markers: According to ASME A13.1.
   2. Plastic markers, with application systems. Install on insulation segment if required for hot non-insulated piping.
   3. Locate pipe markers on exposed piping according to the following:
      a. Near each valve and control device.
      b. Near each branch, excluding short takeoffs for equipment and terminal units. Mark each pipe at branch if flow pattern is not obvious.
      c. Near locations if pipes pass through walls or floors, or enter inaccessible enclosures.
      d. At manholes and similar access points that permit view of concealed piping.
      e. Near major equipment items and other points of origination and termination.

B. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of equipment.
   1. Lettering Size: Minimum 1/4-inch-high lettering for name of unit if viewing distance is less than 24 inches, 1/2 inch high for distances up to 72 inches, and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.
   2. Text of Signs: Provide name of identified unit. Include text to distinguish between multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

C. Adjusting: Relocate identifying devices that become visually blocked by work of this or other Divisions.

3.4 PAINTING AND FINISHING

A. Refer to Division 9 Section "Painting" for paint materials, surface preparation, and application of paint.

B. Apply paint to exposed piping according to the following, unless otherwise indicated:
   1. Ferrous Piping: Use semigloss, acrylic-enamel finish. Include 2 finish coats over rust-inhibitive metal primer.
   2. Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include 2 finish coats over galvanized metal primer.
   3. Ferrous Supports: Use semigloss, acrylic-enamel finish. Include 2 finish coats over rust-inhibitive metal primer.

C. Do not paint piping specialties with factory-applied finish.

D. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.5 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3000 psig, 28-day compressive strength concrete and reinforcement as specified in Division 3 Section, "Cast-in-Place Concrete."

3.6 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal supports in location, alignment, and elevation to support and anchor utility piping materials and equipment.

B. Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

3.7 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage to support and anchor utility materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.8 DEMOLITION

A. Disconnect, demolish, and remove work specified in Division 2 Sections.

B. If pipe, insulation, or equipment to remain is damaged or disturbed, remove damaged portions and install new products of equal capacity and quality.

C. Accessible Work: Remove indicated exposed pipe in its entirety.

D. Work Abandoned in Place: Cut and remove underground pipe a minimum of 2 inches beyond face of adjacent construction. Cap and patch surface to match existing finish.

E. Removal: Remove indicated equipment from Project site.

F. Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation.

3.9 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for utility piping installations. Perform cutting by skilled mechanics of trades involved.

B. Repair cut surfaces to match adjacent surfaces.

3.10 GROUTING

A. Install nonmetallic, nonshrink grout for equipment-support bearing surfaces, pump and other equipment support plates, and anchors. Mix grout according to manufacturer's written instructions.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placing of grout.

E. Place grout on concrete bases to provide smooth bearing surface for equipment.

F. Place grout around anchors.

G. Cure placed grout according to manufacturer's written instructions.

END OF SECTION