

Farmers Market Paragould, Arkansas

Prepared for:

CITY OF PARAGOULD
PARAGOULD, ARKANSAS

August 23, 2021



**ETC ENGINEERS & ARCHITECTS, INC.
1510 SOUTH BROADWAY
LITTLE ROCK, AR 72202**

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PROFESSIONAL CERTIFICATIONS

<p>Seal</p>  <p>A circular professional seal for the State of Arkansas. The outer ring contains the text "STATE OF ARKANSAS". The inner circle contains "REGISTERED PROFESSIONAL ENGINEER" and "No. 12940". The name "SHAWKAT M. ALI" is written at the bottom. A handwritten signature and the date "08/25/2021" are overlaid on the seal.</p>	<p>Seal</p>  <p>A circular professional seal for the State of Arkansas. The outer ring contains the text "REGISTERED ARCHITECT". The inner circle contains "CARL F. MENYHART, JR." and "No. 1007". The name "Carl Menyhart Jr." is written in cursive across the seal. The date "8/25/21" is handwritten at the bottom.</p>
<p>Seal</p>  <p>A circular professional seal for the State of Arkansas. The outer ring contains the text "STATE OF ARKANSAS". The inner circle contains "REGISTERED PROFESSIONAL ENGINEER" and "No. 9529". The name "WILLIAM RAY ANDREWS" is written at the bottom. A handwritten signature and the date "8/25/21" are overlaid on the seal.</p>	<p>Seal</p>
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END OF INDEX TO SPECIFICATIONS

Farmers Market
Paragould, Arkansas

ETC Project Number 200301CPAG

ADVERTISEMENT FOR BIDS

The City of Paragould will receive sealed bids at 301 West Court, Paragould, Arkansas 72450 for the Construction of the new **Farmers Market Building**, Greene County, **until 2:00 P.M. on Tuesday, September 14th, 2021** at which time and place all bids will be publicly opened and read aloud.

The Information for Bidders, Form of Bid, Form of Contract, Plans, Specifications, and Forms of Bid Bond, Performance and Payment Bond and other contract documents may be examined at the following locations:

ETC Engineers & Architects, Inc.
1510 S. Broadway
Little Rock, AR 72202

Paragould City Hall
301 West Court
Paragould, AR 72450

Southern Reprographics, Inc.
Plan Room Services
901 W. 7th St.
Little Rock, AR 72201

Copies of the Contract Documents may be purchased from ETC Engineers & Architects, Inc., 1510 S. Broadway, Little Rock, AR 72202, (501) 375-1786, at a cost of Two Hundred Fifty dollars (\$250.00), non-refundable.

A certified check or bank draft, payable to the order of the City of Paragould, negotiable U.S. Government bonds (at par value), or satisfactory bid bond executed by the bidder and an acceptable surety in an amount equal to five (5%) of the total bid shall be submitted with each bid.

The City hereby notifies all bidders that this contract is subject to applicable labor laws, non-discrimination provisions, wage rate laws and other federal laws including the Fair Labor Standards Acts of 1938. The Work Hours Act of 1962 and Title VI of the Civil Rights Act of 1964 also apply.

Attention is called to the fact that not less than the minimum salaries and wages as set forth in the contract documents must be paid on the project, and that the contractor must ensure that employees and applicants for employment are not discriminated against because of their race, color, religion, sex or national origin.

The City reserves the right to reject any or all bids or to waive any informality in bidding. Bids may be held by the City for a period not to exceed Sixty (60) days from the date of opening of bids for the purpose of reviewing the bids and investigating the qualifications of bidders prior to awarding the contract.

Mayor Josh Agee
City of Paragould

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SECTION 00004

INFORMATION FOR BIDDERS

1. PROJECT SITE

The construction of the Farmers Market Building to be accomplished by the contract is located in City of Paragould, Greene County, Arkansas.

Work consists of the following:

The Farmers Market Building is a one story building of approx. 10,590 sq. ft. There are brick veneered masonry structures at each end of the building, separated by a 7,560 sq. ft. open air Farmers Market area on a concrete floor slab and covered by a steel trussed structure with a standing seam metal roof. The masonry structure at the North end houses Men and Women's public toilets on one side of an open hallway, and an equipment storage room on the other side. The masonry structure at the South end houses a Community Room on one side of an open hallway, and a Concession facility, Family Restroom, and storage room on the other side. Split system heat pump units are used at each end structures for heating and cooling, with the condensing units roof mounted. The building is situated on three feet of compacted fill above an existing thick concrete parking slab which is to remain for stability. Site work consists of asphalt paving around the perimeter of the building, with parking at the South and West sides.

2. PRE-BID CONFERENCE

A pre-bid conference will be conducted at 10:30 AM on the morning of None at the Paragould City Hall conference room. This will be a question and answer session for the benefit of all subs and general contractors, and the Architects will be able to inform the bidders of any issues that they need to be aware of. The conference is not mandatory.

3. RECEIPT AND OPENING OF BIDS

The City of Paragould (OWNER) invites bids on the form attached hereto, all blanks of which must be appropriately filled in. Bids will be received by the City of Paragould, at City Hall, 301 West Court, Paragould, AR 72450, at the time shown on the "Advertisement for Bid", and then at said place publicly opened and read aloud. The envelopes containing the bids will be prepared as indicated below.

The Owner may consider informal any bid not prepared and submitted in accordance with the provisions hereof and may waive any informalities or scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered. No bidder may withdraw a bid within 60 days after the actual date of the opening thereof.

4. PREPARATION OF BID

These contract documents include a complete set of bidding and contract forms which are for the convenience of bidders and are not to be detached from the contract documents, filled out or executed.

Each bid must be submitted on the prescribed bid form as well as accompanied by a Bid Bond. All blank spaces for bid prices must be filled in, in ink or typewritten, in both words and figures, and the foregoing certifications must be fully completed and executed when submitted.

Each bid must be submitted in a sealed envelope bearing on the outside the name of the bidder, his address, and the name of the project for which the bid is submitted. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed as specified in the bid form.

At the time of bid opening, the envelope containing the bid and bid bond will be opened and read aloud for the purpose of qualifying the bid. After all bids and required contract documents have been thoroughly checked by the owner, the successful bidder will be announced and personally informed. Should a low bidder fail to execute all required documentation qualifying his bid, the bid may be rejected and the next lowest bidder awarded the work if he has qualified.

Envelope will be clearly marked as follows:

FROM: _____
(Name of Concern)

ADDRESS: _____
(Street or P.O. Box)

(City, State, Zip Code)

TO: Mayor Josh Agee
City of Paragould

Construction of **Farmers Market Building**

To Be Opened: _____, 2021 at _____

5. SUBCONTRACTS

The bidder is specifically advised that any person, firm or other party to whom it is proposed to award a subcontract, this contractor must possess a current Arkansas Contractors License * and must be able to obtain bonding, and must be acceptable to the owner.

6. FACSIMILE MODIFICATION

Any bidder may modify his bid by facsimile at any time prior to the scheduled opening time for receipt of bids, provided such facsimile is received by the owner prior to the opening time, and, provided further, the owner is satisfied that a written confirmation of the facsimile modification with the signature of the bidder was mailed prior to the bid opening time. The facsimile should not reveal the bid price but should provide the addition or subtraction or other modification so that the final prices or terms will not be known by the owner until the sealed bid is opened. If written confirmation is not received within two (2) days from the bid opening time, no consideration will be given to the facsimile modification.

7. METHOD OF BIDDING

Method of bidding for the project will be as follows:

The proposal is defined as a "Lump Sum Contract". All bids are lump sum and to include all cost associated with the project for a complete turnkey construction.

Bidders must satisfy themselves of the accuracy of the estimated quantities in the bid schedule by examination of the site and a review of the drawings and specifications including Addenda. After bids have been submitted, the bidder shall not assert that there was a misunderstanding concerning the quantities of work or the nature of the work to be done. No alternate bids will be considered unless alternate bids are specifically required by the contract documents.

8. QUALIFICATIONS OF BIDDER

The owner may make such investigations as he deems necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish the owner all such information and data for this purpose as the owner may request. The owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the owner that such bidder is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein. Conditional bids shall not be accepted.

9. BID SECURITY

Each bid must be accompanied by a certified check of the bidder, or a bid bond prepared on the form of bid bond attached hereto, duly executed by the bidder as principal and having as surety thereon a surety company approved by the owner, in the amount of 5% of the bid. Such check or bid bond will be returned to all except the three lowest bidders within three days after the opening of bids, and the remaining check or bid bond will be returned promptly after the owner

and the accepted bidder have executed the contract, or, if no award has been made within 60 days after the date of the opening of bids, upon demand of the bidder at any time thereafter, so long as he has not been notified of the acceptance of this bid.

10. LIQUIDATED DAMAGES FOR FAILURE TO ENTER INTO CONTRACT

The successful bidder, upon his failure or refusal to execute and deliver the contract and bonds required within **Ten (10)** days after he has received notice of the acceptance of this bid, shall forfeit to the owner, as liquidated damages for such failure or refusal, the security deposited with his bid.

11. TIME OF COMPLETION

Bidder must agree to commence work on or before a date to be specified in a written "Notice to Proceed" and to fully complete the project within two hundred forty (240) consecutive calendar days.

12. LIQUIDATED DAMAGES FOR DELAY IN COMPLETION

As actual damages for any delay in completion of the work which the Contractor will be required to perform under the Contract are impossible to determine, the Contractor and his Sureties will be liable for and shall pay to the owner the sum of \$250 as fixed, agreed and liquidated damages for each calendar day of delay from the date stipulated pursuant to the preceding paragraph.

13. CONDITIONS OF WORK

Each bidder must inform himself fully of the conditions relating to the construction of the project and the employment of labor thereon. Failure to do so will not relieve a successful bidder of his obligation to furnish all material and labor necessary to carry out the provision of his contract. Insofar as possible, the contractor in carrying out his work must employ such methods or means as will not cause any interruption of or interference with the work or any other contractor.

14. ADDENDA AND INTERPRETATIONS

No interpretation of the meaning of the plans, specifications or other pre-bid documents will be made to any bidder orally. Every request for such interpretation should be in writing addressed to ETC Engineers & Architects, Inc. at 1510 South Broadway, Little Rock, Arkansas, 72202 RE: Farmers Market Building. To be given consideration, the request must be received at least five days prior to the date fixed for the opening of bids. Any and all such interpretations and any supplemental instruction will be in the form of written addenda to the contract documents which, if issued, will be mailed by certified mail with return receipt requested or sent by facsimile to all prospective bidders (at the respective addresses or fax numbers furnished for such purposes), not later than three days prior to the date fixed for the opening of bids. Failure of any bidder to receive any such addendum or interpretation shall not relieve such bidder from any obligation under his bid as submitted. All addenda so issued shall become part of the contract documents.

15. SECURITY FOR FAITHFUL PERFORMANCE

Simultaneously with his delivery of the executed contract, the Contractor shall furnish a surety bond or bonds as security for faithful performance of this contract and for the payment of all persons performing labor on the project under this contract and furnishing materials in connection with this contract, as specified in the General Conditions included herein. The surety on such bonds shall be a duly authorized company satisfactory to the owner. The use of Arkansas Performance and Payment Bond (14-604 Arkansas Statutes, Rev. 1/76) is mandatory.

16. POWER OF ATTORNEY

Attorneys-in-fact who sign bid bonds or contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.

17. NOTICE OF SPECIAL CONDITIONS

Attention is particularly called to those parts of the contract documents and specifications which deal with the following:

1. Construction Schedule and Periodic Estimates
2. Payments to Contractor
3. Equal Employment Opportunity
4. Certification of Compliance with Air and Water Acts
5. Work by Others
6. Layout of Work
7. Construction Sequence, Maintenance of Traffic, and Maintenance of Access to Individual Properties
8. Contract to Check Plans and Schedules
9. Maintenance Bonds
10. Testing Laboratory Services

18. LAWS AND REGULATIONS

The bidder's attention is directed to the fact that all applicable state laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout, and they will be deemed to be included in the contract the same as though herein written out in full.

19. METHOD OF AWARD - LOWEST QUALIFIED BIDDER

The lowest bid shall be determined by one of the following methods:

1. If no deductive alternative is considered: the lowest total of the bid prices on the base contract (Base Bid)
2. If one or more deductive alternatives are considered: the lowest total after the selected deductive alternatives are subtracted from the Base Bid.

If at the time this contract is to be awarded, the lowest base bid submitted by a responsible bidder does not exceed the amount of funds available to finance the contract, the contract will be awarded on the base bid only (Method #1). If such bid exceeds such amount, the owner may reject all bids or accept one or more deductive bid alternates and may award the contract to the lowest bidder as determined by Method # 2.

20. OBLIGATION OF BIDDER

At the time of the opening of bids each bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the plans and contract documents (including all addenda). The failure or omission of any bidder to examine any form, instrument or document shall in no way relieve any bidder from any obligation in respect of this bid.

21. SAFETY STANDARDS AND ACCIDENT PREVENTION

With respect to all work performed under this contract, the contractor shall:

- a. Comply with the safety standards provisions of applicable laws, building and construction codes and the Manual of Accident Prevention in Construction: published by the Associated General Contractors of America, the requirements of the Occupation Safety and Health Act of 1970 (Public Law 91-596 and the requirement of Title 29 of the Code of Federal Regulations, Section 1518 as published in the Federal Register, Volume 36 No. 75, Saturday, April 17, 1971).
- b. Exercise every precaution at all times for the prevention of accidents and the protection of persons (including employees) and property.
- c. Maintain at his office or other well-known place at the job site, all articles necessary for giving first aid to the injured, and shall make standing arrangements for the immediate removal to a hospital or a doctor's care of persons (including employees), who may be injured on the job site.

22. ARKANSAS STATE LICENSING LAW

- a. Attention of bidders is particularly called to the requirements that all bidders must be in compliance with the requirements of Act 150 of 1965 of the State of Arkansas, effective June 3, 1965, which is the current Arkansas State Licensing * Law for Contractors.
- b. All bonds on this project shall comply with Arkansas Statutory Performance and Payment Bond Law, Act 351 of 1953, as amended by Act 209 of 1957.
- c. Arkansas State Nonresident Contractors Bond Law:

In compliance with Act 37 of 1992, the Contractor shall submit to the Owner, prior to the approval of the general contract, proof of clearance required by this act by the Arkansas State Department of Finance and Administration.

- d. Each bidder submitting a bid to the owner for any portion of the work contemplated by the documents of which bidding is based shall execute and include in the submission of the bid, a certification substantially in the form herein provided to the effect that he has a current Arkansas State Contractor's License* in compliance with the requirements of the aforementioned law.

23. SCHEDULE OF DRAWINGS

INDEX OF SHEETS

Refer to the Drawings

END OF SECTION

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BID PROPOSAL

Bid Time: _____, PM
Bid Date: _____, 2021
Location: Paragould City Hall
301 West Court
Paragould, AR 72450

BID TO: City of Paragould, Arkansas

PROJECT: Farmers Market Building

Gentlemen:

1. The undersigned bidder, in compliance with your request for bids for the above referenced project, having examined specifications, related documents, and site of the proposed project, hereby proposes to construct the Farmers Market Building as described in the specifications contained in this solicitation for bids. These prices entered under "Total Bid" are for a complete turnkey project inclusive of all labor and materials and are to cover the specified equipment and delivery charges as stipulated in the scope of work. Having carefully examined the Contract Documents for this project, as well as the premises and all conditions affecting the proposed construction, the undersigned proposes to provide all labor, materials, services, and equipment necessary for, or incidental to, the construction of the project in accordance with the Contract Documents including the general conditions within the time set forth, for the lump sum base Total Bid of:

\$ _____
Dollar Amount Is To Be Shown Numerically.

Dollar Amount Is To Be Shown Alphabetically.

2. Ark. Code Ann. § 22-9-212 requires the contractor to indicate on this bid form the cost of Trenching Safety Systems. **FAILURE TO SHOW THIS COST WILL INVALIDATE THE BID.** (NOTE THIS COST SHALL BE INCLUDED IN THE ABOVE BASE BID)
3. Completion Date: Bidder agrees that the work will be complete and ready for final payment in accordance with the Contract Documents within **Two Hundred Forty (240)** consecutive calendar days.
4. The undersigned, in compliance with the Contract Documents for the construction of the above named project, does hereby declare:
 - a. That the undersigned understands that the Owner reserves the right to reject any and all bids and to waive any formality.
 - b. The contract will be awarded to the lowest responsive bidder for one of the three bid Options, which is within Owner's budget constraint.

- c. That if awarded the Contract, the undersigned will enter into an Agreement, on a form identical to the form included in the Contract Documents and execute required performance and payment bonds within Seven (7) days after receipt of the Intent to Award, will commence work within Five (5) days after the date of the Notice to Proceed, and will complete the Contract fully within **Two Hundred Forty (240)** consecutive calendar days for thereafter. Should the undersigned fail to fully complete the work within the above stated time, he shall pay the Owner as fixed, agreed and liquidated damages and not as a penalty, the sum of **Two Hundred Fifty dollars (\$250)** for each calendar day of delay until the work is completed or accepted.
 - d. The undersigned further agrees that the bid security payable to Owner and accompanying this proposal shall become the property of the Owner as liquidated damages if the undersigned fails to execute the Contract or to deliver the required bonds to the Owner within Seven days from receipt of the Intent to Award as these acts constitute a breach of the Contractor's duties.
 - e. That this bid may not be withdrawn for a period of 60 days after the bid opening.
 - f. The undersigned understands that the Owner's intent is to construct all facilities proposed within the limits established by the funds appropriated for the project.
 - g. The names of subcontractors and the nature of the work to be performed by each one have been included on the Bid Form.
 - h. The undersigned agrees to pay all prevailing hourly wage rates prescribed and mandated by Ark. Code Ann. § 22-9-301 et. seq., if the bid exceeds \$75,000) or the undersigned agrees to pay all prevailing hourly wage rates mandated by the Davis-Bacon Wage Rates and any other applicable federal regulations.
 - i. Bids submitted by a Joint Venture/Joint Adventure shall be signed by representatives of each component part of the Joint Venture. The licenses of each component part of the Joint Venture shall also be listed in the bid submittal. Therefore, joint venture bidders shall indicate at least two (2) signatures and two (2) licenses numbers on the Bid Form. Exception: Joint Ventures who have been properly licensed with the Arkansas Contractors Licensing Board as a Joint Venture need only to indicate the joint venture license number on the Bid Form. Joint Venture Bidders shall indicate at least two (2) signatures on the bid form even if they are licensed as a joint venture.
5. The following documents are attached to and made a condition of this Bid.
- a. Bid security.
6. The undersigned acknowledges receipt of and inclusion as a part of the Contract Documents the following addenda:

No. _____ Dated _____

No. _____ Dated _____

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

7. LISTING OF ALL SUBCONTRACTORS INCLUDING MECHANICAL, PLUMBING, ELECTRICAL AND ROOFING SUBCONTRACTORS

All subcontractors including mechanical, plumbing, electrical and roofing subcontractors shall be listed regardless of qualifications, licenses or work amount.

Indicate the Name(s) and Address, of each entity performing the listed work:

MECHANICAL (Indicative of HVACR):

_____ License No: _____
Is the amount of work \$20,000.00 or over: Yes___ No ___

ELECTRICAL & LIGHTING SUBCONTRACTOR:

_____ License No: _____
Is the amount of work \$20,000.00 or over: Yes___ No ___

PLUMBING:

_____ License No: _____
Is the amount of work \$20,000.00 or over: Yes___ No ___

EARTHWORK AND SITE DEVELOPMENT:

_____ License No: _____
Is the amount of work \$20,000.00 or over: Yes___ No ___

ROOFING AND SHEET METAL (Indicative of roofing applications):

_____ License No: _____
Is the amount of work \$20,000.00 or over: Yes___ No ___

Respectfully Submitted:

Name of Bidder (Typed or Printed)

Address

BY: (Signature and Title)

Contractor's License Number or Contractor's
(Joint Venture) License Number(s)

Telephone Number

Fax Number

Federal ID Number or SSN#

Date of Bid

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____
_____ as Principal, and _____
_____ as Surety, are hereby held and firmly bound unto, City of Paragould, Arkansas,
as OWNER in the penal sum of five percent (5%) for the payment of which, well and truly to be
made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators,
successors and assigns. Signed this _____ day of _____, 2021.

The condition of the above obligation is such that whereas the Principal has submitted to the
City of Paragould a certain BID, attached hereto and hereby made a part hereof to enter into a
contract in writing, for the Construction of the Farmers Market Building.

NOW THEREFORE

- (a) If said BID shall be rejected, or in the alternate.
- (b) If said BID shall be accepted and the Principal shall execute and deliver a
contract in the Form of Contract attached hereto (properly completed in
accordance with said BID) and shall furnish a BOND for his faithful performance
of said contract, and for the payment of all persons performing labor or furnishing
materials in connection therewith, and shall in all other respects perform the
agreement created by the acceptance of the said BID.

then this obligation shall be void, otherwise the same shall remain in force and effect; it being
expressly understood and agreed that the liability of the Surety for any and all claims hereunder
shall, in no event, exceed the penal amount of the obligation as herein stated.

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

IMPORTANT Surety companies executing bonds must appear on the Treasurer Department's
most current list (Circular 570, as amended) and be authorized in accordance with Section 22 of
the General Conditions to transact business in the State of Arkansas.

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

Principal

Surety

By: _____

Seal

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AGREEMENT

THIS AGREEMENT made this _____ day of _____, 2021, by and between _____ (a corporation organized and existing under the laws of the State of Arkansas) hereinafter called the "Contractor" and **City of Paragould, 301 West Court, Paragould, AR 72450** hereinafter called the "Owner".

WITNESSETH:

That the Contractor and the Owner for the consideration stated herein mutually agrees as follows:

ARTICLE 1. **Statement of Work.** The Contractor shall furnish all supervision, technical personnel, labor, materials, machinery, tools, equipment, incidentals and services, including utility and transportation services and perform and complete all work described in Bid Form and as required for the construction of the **Farmers Market, Greene County, Arkansas,** in strict accordance with the Contract Documents prepared by ETC Engineers & Architects.

ARTICLE 2. **The Contract Price:** The stipulated contract price is _____. The Owner will pay the contractor, because of his performance of the Contract, for the total quantities of work performed at the lump sum and unit prices stipulated in the Proposal, subject to additions, and deductions as provided in the Section entitled "CHANGES IN THE WORK" under GENERAL CONDITIONS.

ARTICLE 3. **Contract Time.** The Contractor agrees to begin work within ten (10) calendar days after issuance by the Owner of a "Work Order" or "Notice to Proceed" and to complete the work within **Two Hundred Forty (240)** calendar days thereafter (except as modified in GENERAL CONDITIONS of these Contract Documents). If the Contractor shall fail to complete the work within the time specified, he and his Surety shall be liable for payment to the Owner, as liquidated damages ascertained and agreed, and not in the nature of a penalty, the sum of **Two Hundred Fifty (\$250) dollars** for each day of delay. To the extent sufficient in amount, liquidated damages shall be deducted from the payments to be made under this Contract.

ARTICLE 4. **Contract.** The executed Contract Documents shall consist of the following:

- a. This Agreement
- b. Addenda
- c. Advertisement for Bids
- d. Information for Bidders
- e. Bid

Farmers Market
Paragould, Arkansas

ETC Project Number 200301CPAG

- f. General Conditions
- g. Supplemental General Conditions
- h. Technical Specifications

This Agreement, together with other Documents enumerated in this Article 4, which said other Documents are as fully a part of the Contract as if hereto attached to herein repeated, form the Contract between the parties hereto. In the event that any provisions in any component part of this Contract conflicts with any provision of any other component part, the conflict shall be resolved by the Engineer whose decision shall be final.

ARTICLE 5. Surety. The Surety on the Performance-Payment Bond shall be a surety company of financial resources satisfactory to the Owner and authorized to do business in the State of Arkansas.

IN WITNESS WHEREOF, the parties hereto have caused this AGREEMENT to be executed in six (6) counterparts, each of which shall be considered an original on the day and year first above written.

ATTEST:

CONTRACTOR

(Contractor)

By: _____

Title _____

City of Paragould, Arkansas

(Owner)

By: _____

Title: _____

NOTICE TO PROCEED

To:

Date:

Project: **Farmers Market Building**

You are hereby notified to commence WORK in accordance with the Agreement dated _____ on or after _____, and you are to complete the work within consecutive calendar days thereafter. All required documentations such as Agreement, Performance Bond and Insurance should be submitted to the Architect/Engineer before or at the Pre-Construction conference meeting.

The date of completion of all WORK is therefore _____.

ETC Engineers & Architects, Inc.:

By:

Title: Project Manager

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by _____ This the _____ day of _____, 2021.

Contractor:

By:

Title:

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Arkansas Statutory Payment and Performance Bond

We _____, as
Principal, hereinafter called Principal, and _____ authorized to do
business in the State of Arkansas, as Surety, hereinafter called Surety, are held and firmly bound unto
_____ as
Obligee, hereinafter called Owner, in the amount of _____
_____ Dollars (\$ _____), for the payment
whereof Principal and Surety bind themselves, their heirs, personal representatives, successors and
assigns, jointly and severally, by these presents.

Principal has by written agreement dated _____ entered into a contract with Owner for

which contract is by reference made a part hereof and hereinafter referred to as the Contract.

THE CONDITION OF THIS OBLIGATION is such that if the Principal shall faithfully perform the Contract on his part and shall fully indemnify and save harmless the Owner from all cost and damage which he may suffer by reason of failure to do so and shall fully reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any such default, and further, that if the Principal shall pay all persons all indebtedness for labor or materials furnished or performed under said Contract, failing which such persons shall have a direct right of action against the Principal and Surety, jointly and severally, under this obligation, subject to the Owner's priority, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

No suit, action or proceeding shall be brought on this bond outside the State of Arkansas. No suit, action or proceeding shall be brought on this bond except by the Owner after six months from the date final payment is made on the Contract, nor shall any suit, action or proceeding be brought by the Owner after two years from the date on which the final payment under the Contract falls due.

Any alterations which may be made in the terms of the Contract, or in the work to be done under it, or the giving by the Owner of any extension of time for the performance of the Contract, or any other forbearance on the part of either the Owner or the Principal to the other shall not in any way release the Principal and the Surety or Sureties, or either or any of them, their heirs, personal representatives, successors or assigns from their liability hereunder, notice to the Surety or Sureties of any such alteration, extension or forbearance being hereby waived.

In no event shall the aggregate liability of the Surety exceed the sum set out herein.

Executed on this _____ day of _____, 20____

Principal

Surety Agent

Attorney-in-Fact

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AIA® Document A201™ – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

**Farmers Market Building
Paragould, Arkansas**

THE OWNER:

**City of Paragould
301 West Court
Paragould, AR 72450**

THE ARCHITECT:

**ETC Engineers & Architects, Inc.
1510 S. Broadway Street
Little Rock, Arkansas 72204**

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ADDITIONS AND DELETIONS:

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

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

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents in the Agreement between the Owner and Contractor (hereinafter the Agreement) consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), the Contractor's bid or proposal, General Requirements, Invitation to Bid, Drawings, Specifications, Addenda, Notifications to Proceed and any changes in the Work approved by the Owner and Contractor 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 (as defined in section 7.4) issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and 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.

§ 1.1.2.1 The Owner and the Contractor hereby commit themselves to good faith negotiation, coordination, and cooperation to assure the timely completion of the Project.

§ 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, dimensions, and character of the Work, generally including but not limited to 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, forms, 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. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith. At the Owner's sole discretion, the Initial Decision Maker may be replaced at any time, for any reason. If the Initial Decision Maker is replaced, notice shall be provided.

§ 1.1.9 Contractor

See 3.1.1 for definition.

§ 1.1.10 Damages for Untimely Performance

Damages for Untimely Performance is a monetary amount to be paid by the Contractor to the Owner, based on anticipated real costs which the Owner will incur, due to the Contractor's failure to complete the Work within the allowable time identified in the Contract Documents.

§ 1.1.11 Delay

A Delay is an event that causes an increase in the duration of the Project, or that changes the sequence of the Work or individual Work activities, thereby preventing completion of the Project within the time period specified in the Contract Documents.

§ 1.1.12 Equal

Equal means material, equipment or methods proposed and warranted by the Contractor as being equivalent to essential attributes of the material, equipment or method specified in the Contract Documents, and approved by the Architect and Project Representative.

§ 1.1.13 Notice To Proceed

Notice to Proceed is a written notice provided by the Owner to the Contractor authorizing the Contractor to proceed with the Work and establishing the date for completion of the Work.

§ 1.1.14 Owner

The Owner is the Board of Regents of the University of Wisconsin. The Board of Regents of the University of Wisconsin System exercises the powers and duties prescribed by Wis. Stat. § 16.855. The terms "Board," "Board of Regents," or "The Board of Regents" as used in this document also refer to the Owner.

§ 1.1.15 Reserved

§ 1.1.16 Project Representative

Project Representative is the person or persons delegated authority to act on behalf of the Owner. The Project Representative will be designated in writing. Owner reserves the right to change its designated Project Representative at any time for any reason. If the Project Representative is changed, notice shall be provided. The Project Representative may, upon written notice, delegate part of their responsibilities to the Architect or Contractor.

§ 1.1.17 Project Schedule

The Project Schedule is a graphic and written analysis of activity duration and sequencing, which is required for successful completion of the Project within the time period identified in the Contract Documents.

§ 1.1.18 Shop Drawing

See 3.12.1 for definition.

§ 1.1.19 Subcontractor

The Subcontractor means a person or firm who enters into a contract with the Contractor or a Subcontractor to perform a portion of the Work. Unless otherwise specifically provided, the term Subcontractor includes Subcontractors of all tiers.

§ 1.1.20 Submittal

Submittals includes Shop Drawings, Product Data, Samples, etc submitted by the Contractor to the Architect regarding some portion of the Work.

§ 1.1.21 Substantial Completion

Substantial Completion is the stage in the progress of the Work when the Project Representative determines that the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so the Project, or designated portion thereof, can be occupied and used for its intended purpose. A Certificate of Occupancy shall precede the Substantial Completion, when a Certificate of Occupancy is part of the Project.

§ 1.1.22 Substitution

Substitution means the use of material or equipment not specified in the Contract Documents, but that the Contractor proposes and warrants as suitable for the use intended and conforms to all other physical, functional, and performance requirements of the Contract Documents.

§ 1.1.24 Surety

Surety is a person or entity licensed to do business in the State of Wisconsin, who provides separate performance bonds and payment bonds to a Contractor to indemnify the Owner against all damages suffered by failure of the Contractor to perform the Work and to pay all lawful claims of Subcontractors, Material Suppliers, and laborers.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all labor, materials, and equipment necessary for the proper execution and completion of the Work with the standard of quality established by the Contract Documents and within the allowable time period specified. The Contract Documents are complementary, with technical provisions set forth in the Specifications and complemented by the Drawings 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. The failure of the Contractor to account for all aspects of the Work in its bid shall not relieve the Contractor from performing the Work.

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

§ 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.

§ 1.2.4 Conflicting Conditions

§ 1.2.4.1 The Architect shall take all reasonable steps to assure that the Contract Documents are as accurate as possible, and provide information which, in the opinion of the Architect, is necessary in preparing bids and constructing the Project. However, it is mutually understood that discrepancies or conflicts in the Contract Documents may be identified, in which case:

- .1 Amendments and addenda take precedence over the Specifications;
- .2 The Specifications take precedence over the Drawings;
- .3 Stated dimensions take precedence over scaled dimensions;
- .4 Large-scale detail drawings take precedence over small-scale drawings; and
- .5 Schedules take precedence over other data on the plans.

§ 1.2.4.2 Architect has the right for first interpretation of any ambiguity in the Contract Documents. Ambiguities in the Contract Documents will be resolved by the Owner if the Contractor and Architect cannot come to an agreement.

§ 1.2.4.3 Where the terms "A/E," "Architect/Engineer," "Architect," or "Engineer" are used in technical Sections of the Specifications, the Contractor shall understand that actions indicated to be accomplished by such named parties are actions which are solely the responsibility of the professional technical advisor and consultant to the Owner

and such actions thus require final approval by the Owner.

§ 1.2.4.4 Periodically, the Architect may provide the Contractor additional instructions and drawings necessary to perform the Work. The Architect shall make a good faith effort to coordinate such instructions and drawings with the Contract Documents, preparing them so they can be reasonably interpreted as a part thereof. If such additional instructions change the scope of Work, provisions of Article 7, Changes in the Work, shall be followed.

§ 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 Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Drawings, Specifications, and other Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the reserved ownership rights. All Drawings and Specifications, renderings, models, scale details, approved copies of shop drawings and other such documents prepared by the Architect or any consultant for this Project shall become the property of Owner on completion and/or acceptance of the work, or upon any basis of termination of the Contract.

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

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission when there is proof that the notice was read by the recipient.

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

§ 1.6.3 The Contractor's presentation to Project Representative, or mailing, of such Notice to Project Representative is a condition precedent to any liability of the Owner for any actual or alleged breach of the Owner's contractual obligations hereunder. The Contractor's failure to give such written Notice in the manner and time prescribed by the Contract Documents shall result in the waiver of any and all claims, demands and causes of action that the Contractor may have against the Owner arising from or in connection with the actual or alleged breach.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties may use AIA Document E203™-2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data. In lieu of separate agreed upon digital form protocols, or the AIA E203, industry accepted standards shall govern the digital communication of data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA

Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees. If Building Information Model and AutoCAD protocols are not established with the preceding, protocols will default to State of Wisconsin Department of Administration protocols.

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. It is the intent of the Owner to provide, to extent possible, a single point of contact and communication for the Contractor to facilitate efficient, timely, and cost-effective completion of the Work. The Owner shall designate in writing a Project Representative, who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization (unless the Contract Documents specifically identify another party responsible for the Owner's activities). Changes to these Contract Documents that modify the General Conditions, Contract cost, and/or Contract time shall only be executed by a person duly authorized with signatory authority by the Board of Regents of the University of Wisconsin System. Person(s) with signatory authority will be identified for the Contractor.

(Paragraphs deleted)

§ 2.3 Information and Services Required of the Owner

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

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

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

§ 2.3.4 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 exercise proper precautions relating to the safe performance of the Work.

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

§ 2.3.6 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.

§ 2.3.7 The Owner shall furnish surveys described in Section 2.3.4 and other information prepared by third parties for the Project to the extent the Owner deems necessary for the performance of the Contractor's services, and shall not withhold any reasonable information. The Owner makes no representations or warranties as to the accuracy of the information it obtains from third parties and provides to the Contractor pursuant to this Section 2.3. In addition, the Owner may provide the Contractor access to the Owner's records, which may contain information about the site and adjacent land and improvements that was not collected specifically for the Project. The Owner makes no representations as to the relevance, accuracy or completeness of information made available to the Contractor from the Owner's records.

§ 2.3.8 The Contractor shall attend a Pre-Construction Meeting, which will be scheduled by the Project Representative and Architect.

§ 2.3.9 The Project Representative or Architect will schedule progress meetings with the Contractor. At each such progress meeting, the parties will discuss the above-mentioned items, cooperate with others to assure successful completion of the Work, and help to quickly resolve problems which arise.

§ 2.4 Owner's Right to Stop the Work

In the event that any of the Work in progress, or Work already completed by the Contractor, or Subcontractors, is determined by the Project Representative to be of substandard quality, defective, or otherwise in violation of requirements of the Contract Documents, or 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 or refuses 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.

§ 2.4.1 The Contractor shall have ten (10) calendar days after the serving of such Notice within which to take corrective action or to make arrangements judged satisfactory by the Project Representative for the corrections to be made. If corrective actions or other arrangements are not judged satisfactory by the Project Representative, the Owner may terminate the Contract in accordance with the provisions of the General Conditions of the Contract.

§ 2.4.1.1 If, after suspension of the Work, it is determined that the Contractor was not in default, or that the delay was excusable, the rights and obligations of the parties will be the same as if the suspension or termination had been issued for the convenience of the Owner under the Contract.

§ 2.4.2 The Project Representative may order the Contractor, in writing, to suspend or delay all or any part of the Work of the Contractor for the period of time that the Project Representative determines appropriate for the convenience of the Owner.

§ 2.4.2.1 If the Contractor determines that the cost of the Work is altered by such suspension, or the time for completion of such Work is altered or delayed, the Contractor shall provide Notice to the Project Representative of any such costs or delay;

§ 2.4.2.2 Such Notice shall be made within ten (10) calendar days of the order to stop or suspend Work;

§ 2.4.2.3 Provision of such Notice to the Project Representative shall be a condition precedent to any Owner liability for increased costs, delay, or time extension.

§ 2.4.3 The Owner may exercise any and all rights or remedies provided for herein, by law or in equity, either concurrently or singly in its sole discretion.

§ 2.5 Owner's Right to Carry Out the Work

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

§ 2.6 Owner's Responsibility For The Site

§ 2.6.1 Prior to start of construction, the Owner shall furnish all land and rights-of-way necessary for the carrying out and completion of the Work to be performed under this Contract.

§ 2.6.2 Reserved.

§ 2.6.3 Reserved.

§ 2.6.4 The Project Representative shall act on any Notice as soon as practicable. If the Project Representative determines that the conditions reported by the Contractor differ materially from those indicated in the Contract Documents, or are of an unknown and unusual nature which could not have been discovered during a reasonable site investigation by the Contractor, then to the extent established by the Contractor and approved by the Project Representative, the Project Representative shall authorize an increase or decrease in the cost or time required for performing any part of the Work under this Contract.

§ 2.6.5 No request by the Contractor for an equitable adjustment to the Contract shall be allowed, unless the Contractor gives proper Notice, which is a condition precedent to any liability on the part of the Owner.

§ 2.6.6 In no event shall any claim by the Contractor for equitable adjustment to the Contract for differing site conditions be allowed if presented after final payment under this Contract is made.

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. The Contractor is any individual, firm, corporation, or other non-governmental organization that, enters into a contract with the Owner to perform all work as required by the Contract Documents and enters into Contracts with Subcontractors including mechanical, electrical, plumbing and fire protection subcontractors identified by the Owner during the Single Prime bidding process. The term Contractor does not include the Owner or the Architect. The term Sub-subcontractor shall be equivalent to the term Subcontractor for all provisions of this Contract.

§ 3.1.1.1 By accepting this Agreement, the Contractor agrees that scheduling, coordination, and monitoring activity for all Work will be placed under the direct control and supervision of a person experienced in construction scheduling, means and methods. If such experience and knowledge must be obtained by contracting with a separate scheduling consultant, the entire cost of such consultant shall be borne by the Contractor. Additionally, the Contractor fully agrees to cooperate in all respects with all Subcontractors and suppliers to provide all data required, and shall coordinate the activities of its own workforces and the Work forces of the Subcontractors, in such manner and at such time as to not cause a delay in the Project

§ 3.1.1.2 The Contractor's bid price shall include the performance of all Work which:

- .1 in accordance with industry standards, customary practice, or by reasonable inference are details of Work that are necessary as part of the construction, operation, and coordination and interface of the Work;
- .2 would necessarily be readily apparent to one skilled in the trades; and
- .3 a component and experienced Contractor would recognize as part of its responsibility.

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

§ 3.1.2.1 The Contractor has the full and complete responsibility for the accomplishment of all Work within the specified time indicated in the Contract Documents, except where the Contract Documents explicitly and specifically place a limited duty for completion on the Owner.

§ 3.1.2.2 The Contractor is hereby put on notice that failure to furnish data or cooperate in good faith is a material breach of Contract and may be the basis for a termination for cause under the procedures set forth in these General Conditions. In such cases the Project Representative, in addition to, and not in lieu of the right to termination for default, may acquire the services of a scheduling specialist to perform any such duties and charge the cost thereof to the Contractor. In the event that the Project Representative is required to acquire any replacement scheduling services, the Contractor shall conform to any revised schedule resulting therefrom.

§ 3.1.2.3 In addition to the criteria set forth in these General Conditions, the full and complete performance of duties required to be performed under this Contract is a condition precedent to the right of the Contractor to payment of any sums due. In the event of any delays by the Contractor or other breach hereof which gives rise to penalties and/or damages to the Owner, then in any such event the Project Representative may offset such penalties and damages against the sums due or to become due the Contractor hereunder.

§ 3.1.2.4 Contractor's obligation for inspection and quality control shall be as provided for these General Conditions.

§ 3.1.2.5 Any Work necessary to be performed after regular working hours, on Sundays, or legal holidays, and for which the Contractor is responsible, shall be performed without additional expense to the Owner.

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

§ 3.1.3.1 In the event it becomes necessary to interpret this Article 3.1.3, the interpretation shall strive to achieve timely, effective and efficient performance of the Work under the Contract within the allowable time identified in the Contract Documents, and at no extra cost or inconvenience to any party, if at all possible.

§ 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.

§ 3.2.1.1 The Contractor is responsible for and hereby acknowledges that it has taken the steps reasonably necessary to prepare a bid which includes the costs for Work, the requirement for which would reasonably be known to a competent Contractor, in overcoming normal subsurface conditions at the site where the Work is to be performed and in order to accomplish the Work described in the Contract Documents. Additionally, the Contractor certifies that it has investigated the site and satisfied itself as to the general and local conditions which affect the Work or its cost, including, but not limited to:

- .1 Conditions bearing upon transportation, disposal, handling, and storage of materials;
- .2 The availability of labor, water, electric power, and roads or access;
- .3 Uncertainties of weather, river stages, tides, or similar physical conditions at the site;
- .4 The conformations and conditions of the ground; and
- .5 The character of facilities and equipment as represented by the Contract Documents.

§ 3.2.1.2 The Contractor also acknowledges that it has satisfied itself as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from a non-exploratory, visual inspection of the site, and information included in the Contract Documents.

§ 3.2.1.3 Any failure of the Contractor to take the actions described and acknowledged in will not relieve the Contractor from responsibility for estimating properly the difficulty and cost of successfully performing the Work, or for proceeding to successfully perform the Work without additional expense to the Owner.

§ 3.2.1.4 The Owner assumes no responsibility for any erroneous conclusions or interpretations made by the Contractor based on the information made available by the Owner. The Owner expects the Contractor to have the ability to interpret provided technical information, including geotechnical information, which would be reasonably analyzed or interpreted by any bidder knowledgeable and skilled in the work required by the bid. If the Contractor does not have the ability to interpret or analyze such information, it is the responsibility of the Contractor to obtain the professional services required to perform such analysis. The Owner assumes no responsibility for any understanding reached or representation made concerning conditions which can affect the Work by any of its officers, representatives, or agents before the execution of this Contract, unless that understanding or representation is expressly stated in the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, 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 and Project Representative any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect or Owner 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 Project Representative and Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Owner may require.

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

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall (1) give timely notice to the Project Representative and Architect; (2) shall propose alternative means, methods, techniques, sequences, or procedures; and (3) not proceed with that portion of the Work until the Contractor is satisfied such work can be performed safely and has received Notice from the Project Representative. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

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

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

§ 3.3.3.1 The Contractor shall, except where a provision of the Contract Documents explicitly states to the contrary, have the full, complete, and absolute responsibility and obligation for insuring that the Work performed by the Contractor and Subcontractors strictly conforms to the requirements set forth in the Contract Documents. The Contractor shall maintain an adequate inspection and quality control system and shall perform such inspections as will ensure that the Work performed under this Contract conforms to the requirements of the Contract Documents.

§ 3.3.3.2 At the Pre-Construction Meeting, the Contractor shall provide the Project Representative a full description of the Contractor's safety, quality control and inspection system and method of implementation.

§ 3.3.3.3 Prior to the start of significant on-site work by any trade, Project Representative, the Contractor's Superintendent and the Subcontractor's foremen, shall conduct a pre-installation conference. The purpose of the meeting is to review and discuss Contract requirements applicable to the work, samples required, level of quality necessary, and find answers to any questions that may arise. Such meeting is in addition to regularly-scheduled progress meetings and will be arranged on-site by Project Representative.

§ 3.3.3.4 The Contractor shall maintain complete inspection records and test data to ensure that quality of the Work is in strict compliance with the terms of the Contract Documents. These records shall be available to the Project Representative at all reasonable times and places. The doctrine of "substantial conformity" to the quality requirements of the Contract Documents shall have no application, unless the Project Representative accepts the Work in accordance the conditions of the Contract.

§ 3.3.3.5 The Owner reserves the right to conduct its own quality assurance verification, and to observe, inspect, and /or conduct tests relative to Contractor and Subcontractor performance. If, when conducting its own quality assurance program, the Owner determines that the Work or a portion thereof does not comply with requirements of the Contract Documents, the Owner shall attempt to notify the Contractor of such deficiencies as soon as practicable. However, the Owner's exercise of rights under this provision does not:

- .1 Relieve the Contractor of the responsibility for providing adequate inspection and quality control measures or the proper documentation of the occurrence of the events required to be tested or monitored in the performance of the Work required by the Contract Documents; and shall provide no basis for waiver or estoppel claims to be asserted against the Owner;
- .2 Relieve the Contractor of responsibility for damage to or loss of the material before acceptance;
- .3 Constitute or imply acceptance on the part of the Owner; or
- .4 Affect the continuing rights of the Owner after acceptance of the completed Work, except as specifically stated to the contrary in the Contract Documents.

§ 3.3.3.6 The presence or absence of the Project Representative does not relieve the Contractor from any Contract requirement. If the Contractor desires waiver of any technical or Contract requirement or any other deviation from the strict requirements of the Contract Documents, a specific request for such waiver or deviation must be made to the Project Representative and Architect for consideration.

§ 3.3.3.7 The Contractor shall, without charge, replace or correct Work found not to conform to the Contract Document requirements, unless the Owner agrees to accept the non-conforming Work with an appropriate adjustment in the Contract price thereof. Such acceptance of non-conforming Work shall, whether the determination is to be made at the time of final completion or during the performance of Work, be based upon a determination by the Owner that the deviation from Contract Documents requirements does not adversely affect the integrity of completed Work.

§ 3.3.3.9 Unless otherwise specified in the Contract, the Project Representative shall accept, as reasonably as practicable after completion and inspection, all Work completed under the Contract or that portion of the Work which the Project Representative determines can be accepted separately.

§ 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 within the specified time, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work. No materials or supplies which are to become part of the Work shall be purchased by the Contractor or by any Subcontractor subject to any chattel mortgage, conditional sale contract, or other agreement by which a security interest is retained by the seller.

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

§ 3.4.2.1 It is not the intention of the Owner to limit or restrict competition by the use of any reference to a particular manufacturer, process, technique, catalog number or other identifying information. Such proprietary specifications are intended to establish a level of quality or the minimum essential requirements to which the Contractor must conform, unless more explicit restrictions are stated to apply.

§ 3.4.2.2 When the Contract Documents list performance or functional characteristics in connection with Work to be performed, these characteristics are mandatory for reasons of design. Use of any Substitution shall be subject to the prior written approval of the Architect.

§ 3.4.2.3 Material, equipment, or processes offered for use as a substitution may be proposed by the Contractor in writing. Such proposals shall guarantee the proposed Substitution to be capable of performing the duties of the originally specified material, equipment, or process. The Architect shall respond to any such proposal as soon as practicable, but in no case later than seven (7) working days after receipt of such proposal.

§ 3.4.2.4 It shall be the sole responsibility of the Contractor to provide all documentation, regardless of type or quantity, to clearly establish the qualifications of items proposed as Substitutions under this Contract. If the value of the Substitution is less than the item specified in the Contract Documents, then an equitable reduction of the price of the Contract shall be made.

§ 3.4.2.5 When Substitutions are approved by the Project Representative and incorporated into the Project by the Contractor, all costs incurred to 1) correct deficiencies in items, 2) provide for installation or hookup, or 3) to achieve performance specified in the Contract Documents, will be borne by the Contractor.

§ 3.4.2.6 Any substitute material or equipment installed by the Contractor without approval of the Project Representative shall be subject to immediate removal and all costs required to conform to the Contract Documents shall be borne by the Contractor.

§ 3.4.2.7 The Contractor shall assume all liability and responsibility for any changes in the Work or additional Work required to accommodate use of proposed and approved Substitutions. The Owner's approval of such Substitutions does not relieve the Contractor from the obligation to pay all additional costs resulting from their inclusion in the Work, even if additional costs or Work become apparent after execution of the change or installation of the Substitution. The Contractor's liability shall include payment of any additional costs incurred by the Owner, made necessary by, or directly connected to, such changes.

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

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner 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, including substitutions not properly approved and authorized, 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 or Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

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

§ 3.5.3 The Contractor warrants to the Owner that all materials and supplies used in the Work are free from all liens, claims, or encumbrances, and good title to materials and supplies is retained by the Contractor and shall be conveyed prior to approval of final payment.

§ 3.5.4 Printed, signed copies of Manufacturer's warranties, which are required by the Contract Documents, shall be presented to the Project Representative prior to substantial completion.

§ 3.5.5 All warranties, including manufacturer's warranties and Contractor warranties, shall take effect on the date of Substantial Completion and shall remain in effect for a period of one (1) year thereafter, unless Contract Documents specifically require a different warranty period.

§ 3.5.6 If any part of the Work is declared Substantially Complete by the Project Representative, and the Owner takes possession of that portion of the Work before completion of the entire Project, the warranty for that portion of the Work shall continue for a period of one (1) year from the date of Substantial Completion for that portion of the Work, unless Contract Documents specifically require a different warranty period.

§ 3.5.7 The Contractor shall remedy, at the Contractor's expense, any defect in the Work. In addition, the Contractor shall remedy, at the Contractor's expense, any damage to the Owner's property, whether controlled or owned, when the damage is the result of:

- .1 The Contractor's failure to conform to Contract Document requirements; or
- .2 Any defect in equipment, material, Workmanship, or design furnished by the Contractor or Subcontractors regardless of tier.

§ 3.5.8 The Contractor shall warrant any Work restored or replaced due to damage caused in fulfilling the terms and conditions of this Article 3.5, or during performance of any Work required by the Contract Documents. The Contractor's warranty with respect to Work repaired or replaced will run for one (1) year from the date of Substantial Completion of said repair or replacement.

§ 3.5.9 The Project Representative shall notify the Contractor, in writing, within a reasonable time after discovery of any failure, defect, or damage.

§ 3.5.10 If, after the receipt of a Notice of a claim under this warranty, the Contractor fails to remedy any failure, defect, or damage within a time judged reasonable by the Project Representative, the Project Representative shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage, at the Contractor's expense.

§ 3.5.11 All warranties under this Contract or in any related to this Contract, express or implied, shall be obtained for and shall be subject to direct enforcement by the Owner. The Contractor shall provide in each subcontract, or other purchase agreement, for the assignment to the Owner of all such warranties and for the right of enforcement by the Owner. In addition, if necessary the Contractor shall:

- .1 Obtain for the Owner's benefit all warranties that would be given in normal commercial practice;
- .2 Require all warranties to be executed, in writing, for the benefit of the Owner, if so directed by the Project Representative;
- .3 Enforce all warranties for the benefit of the Owner; and

- .4 Obtain for the Owner's benefit all warranties given by any Subcontractor, at any tier, if such warranty is in excess of the one (1) year warranty period set forth herein.**

§ 3.5.12 Unless a defect is caused by the negligence of the Contractor or Subcontractors at any tier, the Contractor shall not be liable for the repair of any defects of material or design furnished by the Owner.

§ 3.5.13 The Contractor shall require any Subcontractor manufacturers, or suppliers to execute their warranties, in writing, directly to the Owner.

§ 3.6 Taxes

The Contractor shall pay all sales, consumer, use, and other similar taxes required by law assessed to or arising out of the construction of the Project. Per 2017 Wis. Stat. § 77.54 (9m), building materials sold to a construction contractor that will become a component of a facility owned by the Board of Regents of the University of Wisconsin System are exempt from sales and use tax.

§ 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, and shall provide evidence of such permits, licenses, and approvals at the Pre-Construction Meeting or before commencement of the Work.

§ 3.7.1.1 Charges for water, sewer, and other utility connections made by municipalities will be paid by the Owner. Payment for use of such services and utilities before Substantial Completion shall be in accordance with provisions of the Contract.

§ 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 and/or relating to environmental quality and safety, the performance of the Work, the protection of adjacent property, and the maintenance of passageways, guard fences, or other protective facilities. Such Work shall not be subject to the ordinances or regulations (except land use zoning) of the municipality in which the construction takes place, including ordinances or regulations relating to materials used, permits, supervision of construction or installation, payment of permit fees, or other restrictions of any nature whatsoever. The Project Representative shall be notified by the Contractor of any notices of noncompliance or violation associated with Work required by the Contract Documents.

§ 3.7.2.1 Where Contract Documents require abatement of asbestos containing materials, prior written notice to the State of Wisconsin, Department of Natural Resources is required. The Contractor shall provide evidence of such notice prior to commencement of the Work. Contractor shall follow all State of Wisconsin and Federal rules associated with asbestos abatement.

§ 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 14 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 that an equitable adjustment be made 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, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner 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, except for subcontractors selected in the single prime bidding process.

§ 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. The Contractor shall give continuous personal superintendence to the Work and its performance at the site, or shall employ a construction superintendent or foreman, experienced in Work of the character covered by the Contract Documents. This person shall be delegated authority to act on behalf of the Contractor, and shall be, to the extent possible, a single point of contact and communication for the Project Representative, Architect, and all Subcontractors to facilitate efficient, timely, and cost effective completion of the Work. Communications given to the superintendent shall be as binding as if given to the Contractor. Communications between the Architect and Contractor shall be timely relayed to the Project Representative.

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

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

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.1.1 The Project Schedule shall incorporate all activities, events, and milestones required for successful Project completion within the allowable time for completion specified in the Contract Documents. The Contractor shall prepare a breakdown of all Work activities or events, whether the activities are to be performed by the Contractor's own forces, those of Subcontractors or the Owner, indicating the proposed duration and sequencing of such activities for successful completion of the Project within the allowable time specified in the Contract Documents. No single Work activity in the Project Schedule shall be for more than \$500,000 in Contract value or for a duration greater than four (4) successive weeks. The Contractor shall also identify whether any Work activity or event is dependent on the Work of its own forces or with those of the Owner. The failure to list any activity or to perform any other duty required by or incident to that required by these General Conditions shall not be the basis of a claim for adjustment of any provision of this Contract, or of any other type of claim whatsoever.

§ 3.10.1.2 The Contractor shall, within fourteen (14) calendar days from the Notice to Proceed, develop and publish a Project Schedule for the first sixty (60) calendar days of the Project. The completed Project Schedule, for all Work activities through Project completion, shall be developed and published within this sixty (60) day period. Pursuant to Wis. Stat. § 16.855 (14m)(d), the Contractor must base this Project Schedule on the schedule that the mechanical, electrical or plumbing Subcontractors and Contractors bid on (in the Specifications or bid instructions), unless otherwise agreed to by the Subcontractor. The Contractor shall update the Project schedule monthly.

§ 3.10.1.3 If the Contractor's Work depends upon construction or operations by the Owner, the Contractor shall, prior to proceeding with that portion of the Work, promptly give Notice to the Project Representative of any apparent deficiencies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor to so report shall constitute an acknowledgment that the Owner's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 3.10.1.4 The Contractor shall identify forthwith any critical event which will require the Owner to act or to refrain from acting, or critical time periods within which the Owner must complete activities or Work for which the Owner is responsible under the Contract. Timely Notice of any such identified event or time period shall be given to the Owner. The giving of such Notice is a condition precedent to the creation of any duty of the Owner to take any action or to refrain from taking any action. The failure of the Contractor to give such Notice forthwith shall thereafter bar and preclude any claim by the Contractor for adjustment of any Contract provision or claim predicated on the breach of any obligation by the Owner.

§ 3.10.1.5 The bonds furnished to secure these commitments shall be applicable to each and every one of these time and scheduling commitments.

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

§ 3.10.2.1 If the Contractor submits for approval items which do not strictly comply with the design requirements of Contract Documents, the Contractor shall provide all engineering or design information necessary for complete evaluation of the Submittal by the Architect and Project Representative. If it is determined by the Contractor or the Project Representative that the services of a professional consultant, engineer or architect are required to provide such information, the Contractor shall acquire such services at its own expense.

§ 3.10.2.2 If the Contractor believes that requirements of the Contract Documents are in conflict with the manufacturer's recommended method of installation or application of specified materials, products, or systems, the Contractor shall indicate such possible conflicts at the time of Submittal.

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

§ 3.10.3.1 The Owner shall be given the opportunity to schedule its own Work as conveniently as is consistent with the overall needs of the Project Schedule.

§ 3.10.3.2 Where any Work activity required for completion of the Project is completed in less time than required, anticipated, or otherwise allowed by the Project Schedule, the unused time, hereinafter called Float, shall belong to the Project, to be used by the Contractor as the Project needs determine, including but not limited to providing additional time for completion of any other Work activities required for completion of the Project. Float shall not be considered owned, subject to the exclusive use, or management by any of the interested participants. No claim against the Owner or the Contractor shall be made by any party for the loss of Float time.

§ 3.10.3.3 The Contractor shall be independently responsible for resolving any time related matters with Subcontractors, suppliers, or others who may furnish supplies or services on the Project. No liability shall attach to the Owner, for the failure of any party to carry out the coordination and scheduling responsibilities which they have assumed under the Contract.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required Submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and 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, such as mock-ups, that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar Submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require Submittals. Review by the Architect 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. The following provisions shall apply to all Submittals:

- .1** THE CONTRACTOR NOTES THE CONSPICUOUS NATURE OF THIS ARTICLE and agrees that these provisions are material provisions and are to be enforced, in the event of controversy, in such a manner as to place upon the Contractor the full, complete, and total responsibility for the Submittal's conformance with the requirements of this Contract, and suitability or usability of preliminary submissions by the Contractor, without regard to any the Owner action or failure to act.
- .2** All Submittals and supporting information shall be delivered to a party designated by the Owner, who shall act on any such Submittal within 14 calendar days or notify the Contractor in writing, of the time required for such action if greater than the aforementioned 14 day period. Such designation shall take place at the Project Pre-Construction Meeting. Review of the Submittals for conformance with requirements of the Contract Documents shall be completed by the party responsible to the Owner for Project design. A copy of all such Submittal and transmittal forms shall also be sent to the Project Representative.

- .3 The Contractor shall make Submittals in a timely fashion to assure completion of the entire Project within the allowable time specified in the Contract Documents. The timing of such Submittals shall be subject to the provisions of the contract.
- .4 Each Submittal by the Contractor shall contain the cover page included in the Specifications. Such cover page shall be signed by a representative of the Contractor responsible for review of the Submittal to assure compliance with requirements of the Contract Documents.
- .5 The Contractor timing and phasing of Submittals shall be appropriate to the critical path project schedule, and to facilitate the timely review by the Architect.

§ 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. Submittals shall be provided in response to requests for Submittals by the Project Representative, or whenever required by the Contract Documents.

§ 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 the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar Submittals, unless the Contractor has specifically notified the Architect and Project Representative 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 notice, the Architect's approval of a resubmission shall not apply to such revisions.

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

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other Submittals prepared by such professional. Shop Drawings, and other Submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this

Section 3.12.10, the Architect will review and approve or take other appropriate action on Submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

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

§ 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, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment. The Contractor shall avoid interruptions of the Owner's operations.

§ 3.14 Cutting and Patching

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

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

§ 3.15 Cleaning Up

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

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

§ 3.16 Access to Work

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

§ 3.17 Royalties, Patents and Copyrights

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

§ 3.18.1.1 The obligations of the Contractor under this indemnification shall not extend to the liability of the Owner, the Architect and its agents or employees thereof arising out of (1) preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or Specifications, or (2) the giving of or the failure to give directions or instructions thereof provided such giving or failure to give is the cause of the injury or damage.

§ 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.

§ 3.19 Contractor Performance Evaluation

§ 3.19.1 The Contractor acknowledges that following completion of the Work, the Project Representative will evaluate the Contractor's performance under this Contract. Such evaluation may take place after Substantial Completion or after Final Completion of the Work, as determined by Project Representative. The purpose of such evaluation includes, but is not limited to, determining whether or not the Contractor responsibly performed its Contractual obligations and whether or not the best interests of the Owner were promoted thereby.

§ 3.19.2 Project Representative shall provide a copy of any such performance evaluation to the Contractor, as soon as practicable after completion of such evaluation.

§ 3.19.3 The Contractor may appeal results of the Contractor's performance evaluation completed by the Project Representative by submitting a request for performance review to the Owner. Any such request must include the reasons for such request, and documentation necessary to substantiate the Contractor's claim that initial performance evaluation was inappropriate or otherwise in error.

§ 3.19.4 The Owner reserves the right to waive the results of such performance evaluation(s) if, in the opinion of the Owner, corrective action has been taken to remediate substandard performance, events beyond the control of the Contractor resulted in substandard performance, or the best interests of the Owner will be served.

§ 3.19.5 The Contractor acknowledges and agrees that such evaluation(s) may be used by the Owner pursuant to Wis. Stat. § 16.855(9m) when determining whether the Contractor is a "qualified responsible bidder" for future Project(s); provided, however, any such evaluation made more than five (5) years prior to the submission of any such subsequent bid shall not be considered in any event.

§ 3.19.6 The Contractor acknowledges and agrees that all such evaluations so prepared by Project Representative shall constitute "open public records" available for inspection and copying as provided for by law.

ARTICLE 4 ARCHITECT

§ 4.1 General

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

§ 4.1.2 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.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents until the date of 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.

§ 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 promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) 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

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 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 request inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the 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, 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 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 order 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 work with the Project Representative to conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; assist the Project Representative in issuing 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 representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 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.

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

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

§ 5.2.1.1 The Contractor must offer a subcontract to the successful mechanical, electrical and plumbing Subcontractors identified by the Owner and included in the Contractor's bid. This subcontract between a Contractor and a mechanical, electrical and plumbing Subcontractor must include a scope of work clause identical to the scope of work clause included in the Bid Documents and the contract between the Contractor and the Owner. A Contractor and a mechanical, electrical and plumbing Subcontractor may not enter any agreement in connection with bids submitted that would alter or affect the scope or price of the contracts entered into. This prohibition does not apply to the Owner's change orders that result in changes to the plans or specifications, or to back charges allowed by the contract. The Contractor shall base its Project Schedule on the schedule in the Specifications or bid instructions unless otherwise agreed to by the mechanical, electrical and plumbing Subcontractor.

§ 5.2.1.2 The Contractor may enter into subcontracts for work other than mechanical, electrical and plumbing Subcontractor work, if subcontractors are approved by Project Representative through the Request for Subcontractor Approval Form. However, the election to subcontract Work shall not relieve the Contractor from responsibility or liability which it has assumed under this Contract. The Contractor shall remain liable to the same extent that its liability would attach, as if the Work had been performed by the Contractor's own employees. If the Specifications require or otherwise designate only one Subcontractor or source of supply for Work required under the Contract Documents, the Contractor's failure to acquire suitable Contract arrangements with such Subcontractor or source of supply shall not excuse the Contractor from full responsibility and liability for any failure or default of such source of supply.

§ 5.2.1.3 Bidders shall submit a completed Request for Subcontractor Approval Form with their bid or within seven days of the Contractor bid opening. Submission of a completed Request for Subcontractor Approval Form is an element of responsiveness. Failure to submit this completed form within the above time limits will be considered unresponsiveness and may result in contract award to the next apparent low bidder. When no Subcontractors are anticipated, the Contractor shall give notice of this fact on the Request for Subcontractor Approval Form within the time limits noted above.

§ 5.2.1.4, All Subcontractors are subject to Owner's approval. The Owner may request, or the Contractor may provide, any of the following information to substantiate the proposed Subcontractors' qualifications or ability to perform the Work. The Owner shall consider such information when reviewing the qualifications of proposed Subcontractors to determine whether such qualifications serve the best interests of the Project.

- .1 The amount of experience completing similar Work to that required by the Contract Documents;
- .2 The quality of work the proposed Subcontractor has provided on past projects;
- .3 The extent of available staffing and financial resources of the proposed Subcontractor;
- .4 The Contractor's intended method of monitoring the proposed Subcontractor's Work;
- .5 The level of supervision of the Subcontractor's Work which the Contractor will provide; and
- .6 Any other information regarding the proposed Subcontractor's ability to complete the Work.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect 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, and met all other applicable criteria, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution. The Contractor shall not replace any Owner-identified or approved Subcontractor or material supplier without written approval of the Owner. Any Contractor request for replacement of a Subcontractor previously approved by the Owner shall include the reason(s) for such replacement and all documentation necessary to substantiate such change.

§ 5.2.5 The Contractor agrees to maintain a list of all Subcontractors and suppliers performing labor or furnishing materials for the project.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner 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.

(Paragraphs deleted)

§ 5.3.1 The Contractor shall be fully responsible for all acts and omissions of all Subcontractors and shall be responsible for scheduling and coordinating the Work of all Subcontractors and material suppliers.

§ 5.3.2 Nothing herein shall be construed to create any express or implied contractual relationship between Owner and any of the Contractor's Subcontractors, suppliers or vendors.

§ 5.3.3 The Contractor shall cause Article 10.2 (Safety of Persons and Property), with appropriate changes in paragraph and entity designation, to be incorporated in all Subcontracts, regardless of tier.

§ 5.3.4 The Contractor shall insert the following mandatory provisions, with appropriate changes in paragraph and entity designation, in all subcontracts with Subcontractors:

- .1 Article 9 - Payments and Completion
- .2 Article 9.6.2 and 9.6.5.1- Progress Payments
- .3 Article 13.8 - Nondiscrimination/Affirmative Action
- .4 Article 13.9 - Minimum Wages

§ 5.3.5 Pursuant to Wis. Stat. §16.855 (14m)(a), any contract that the Contractor (referred to below as General Prime Contractor) enters into with a subcontractor as defined under Wis. Stat. §16.855 (14)(e) shall include the following mandatory provisions:

PROMPT PAYMENT (General prime contractor) shall pay (mechanical, electrical, or plumbing subcontractor) in accordance with Wis. Stat §16.855(19)(b), for work that has been satisfactorily completed and properly invoiced by (mechanical, electrical, or plumbing subcontractor). A payment is timely if it is mailed, delivered, or transferred to (mechanical, electrical, or plumbing subcontractor) by the deadline under Wis. Stat §16.855(19)(b).

If (mechanical, electrical, or plumbing subcontractor) is not paid by the deadline in this Contract, (general prime contractor) shall pay interest on the balance due from the eighth day after the (general prime contractor) receives payment from the Board of Regents for the work for which payment is due and owing to (mechanical, electrical, or plumbing subcontractor), at the rate specified in Wis. Stat §71.82, compounded monthly.

A (mechanical, electrical, or plumbing subcontractor) that receives payment as provided under this Contract and that subcontracts with another entity shall pay those subcontractors, and be liable for interest on late payments to those subcontractors, in the same manner as the (General prime contractor) is required to pay the (mechanical, electrical, or plumbing subcontractor) under this Contract.

INSURANCE AND BONDS (mechanical, electrical, or plumbing subcontractor) shall not commence work under this Contract until it has obtained all necessary insurance required of (mechanical, electrical, or plumbing subcontractor) in the contract between the (general prime contractor) and the Board of Regents.

(Mechanical, electrical, or plumbing subcontractor) shall provide a separate 100 percent performance bond and a separate 100 percent payment bond to the benefit of the (general prime contractor) as the sole named obligee. Original bonds shall be given to the (general prime contractor) and a copy shall be given to the Board of Regents no later than 10 days after execution of this Contract.

INDEMNIFICATION To the fullest extent permitted by law, (mechanical, electrical, or plumbing subcontractor) shall defend, indemnify, and hold harmless (general prime contractor) and its officers, directors, agents, and any others whom (general prime contractor) is required to indemnify under its contract with the Board of Regents,

and the employees of any of them, from and against claims, damages, fines, penalties, losses, and expenses, including but not limited to attorney fees, arising in any way out of or resulting from the performance of the work under this Contract, but only to the extent such claim, damage, fine, penalty, loss, or expense: (1) is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of property, including but not limited to loss of use resulting therefrom and is caused by the negligence, or acts or omissions, of (mechanical, electrical, or plumbing subcontractor), its subcontractors, any of their employees, and anyone directly or indirectly employed by them or anyone for whose acts they may be liable, or (2) as related to such claims, damages, fines, penalties, losses, and expense of or against (general prime contractor), results from or arises out of the negligence of the (general prime contractor) or other fault in providing general supervision or oversight of the work of (mechanical, electrical, or plumbing subcontractor) or (3) as related to claims, damages, fines, penalties, losses, and expense against the Board of Regents arises out of the Board's status as owner of the project or project site.

In addition (mechanical, electrical, or plumbing subcontractor) shall defend, indemnify, and hold harmless (general prime contractor) and its officers, directors, agents, and any others (general prime contractor) is required to indemnify under its contract with the Board, and the employees of any of them, from any liability, including liability resulting from a violation of any applicable safe place act, that (general prime contractor) or the Owner incurs to any employee of (mechanical, electrical, or plumbing subcontractor) or any third party where the liability arises from a derivative claim from said employee, when the liability arises out of the failure of the (General prime contractor) or the Owner to properly supervise, inspect, or approve the work or work area of (mechanical, electrical, or plumbing subcontractor), but only to the extent that the liability arises out of the acts or omissions of (mechanical, electrical, or plumbing subcontractor), its employees, or anyone for whom (mechanical, electrical, or plumbing subcontractor) may be liable, or from (mechanical, electrical, or plumbing subcontractor's) breach of its contractual responsibilities or arises out of (General prime contractor's) negligence or other fault in providing general supervision or oversight of (mechanical, electrical, or plumbing subcontractor's) work or arises out of The Board of Regents' status as owner of the project or project site. In claims against (general prime contractor) or the Owner by an employee of (mechanical, electrical, or plumbing subcontractor) or its subcontractors or anyone for whose acts (mechanical, electrical, or plumbing subcontractor) may be liable, the indemnification obligation of this paragraph is not limited by a limitation on amount or type of damage, compensation, or other benefits payable by or for the (mechanical, electrical, or plumbing subcontractor) subcontractors under workers compensation act.

Except as identified above, the obligations of (mechanical, electrical, or plumbing subcontractor) under this indemnification do not extend to the liability of (general prime contractor) and its agents or employees arising out of (1) preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs, or specifications; (2) the giving of or failure to give directions or instructions by the (general prime contractor) or the or their agents or employees provided the giving or failure to give is the cause of the injury or damage; or (3) the acts or omissions of other subcontractors.

RETAINAGE Retainage shall occur and be in amounts and on a schedule equal to that in the contract between (general prime contractor) and the Owner. Pursuant to Wis. Stat. §16.855(19)(b), Retainage between Contractor and mechanical, electrical and plumbing subcontractors is governed as follows:

As the work progresses under any subcontract as defined under Wis. Stat. § (14)(e) for construction of a project, the Contractor shall, upon request of a subcontractor, pay to the subcontractor an amount equal to the proportionate value of the subcontractor's work properly completed, less retainage. The retainage shall be an amount equal to not more than 5 percent of the subcontractor's work completed until 50 percent of the subcontractor's work has been completed. At 50 percent completion, no additional amounts may be retained, and partial payments shall be made in full to the subcontractor unless the Board certifies that the subcontractor's work is not proceeding satisfactorily. At 50 percent completion or any time thereafter when the progress of the subcontractor's work is not satisfactory, additional amounts may be retained but the total retainage may not be more than 10 percent of the value of the work completed. Upon substantial completion of the subcontractor's work, any amount retained shall be paid to the subcontractor, less the value of any required corrective work or uncompleted work. All payments the general prime contractor makes under this paragraph shall be within 7

calendar days after the date on which the general prime contractor receives payment from the Board.

Pursuant to Wis. Stat. §16.855(14m)(b), subcontracts under sub (14)(e) must include a scope of work clause that is identical to the scope of work clause on which the subcontractor bid. The following Scope of Work language shall be included in the contracts between the general prime contractor and subcontractors:

SCOPE OF WORK The mechanical, electrical and plumbing subcontractor scope of work is identical to the general prime contractor scope of work included in these bidding and contract documents. By submitting and signing a bid, all bidders have examined all the Bidding Documents listed in the Table of Contents of the project Specifications. The successful bidders will be required to do all work which is shown on the drawings, mentioned in the Specifications, or reasonably implied as necessary to complete the division of work bid for this project.

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 term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When 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 any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its 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 or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner 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 notify the Architect and Project Representative of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect and Project Representative of apparent discrepancies or defects prior to proceeding with the Work 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. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 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 that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor 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, and Separate Contractors 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 Project Representative 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.

§ 7.1.2.1 The giving of each Notice by the Contractor as prescribed by this Article 7, shall be a condition precedent to liability of the Owner for payment of any additional costs incurred by the Contractor in implementing changes in the Work. Under this Article 7, no order or statement of the Owner shall be treated as a Change Order, or shall entitle the Contractor to an equitable adjustment of the terms of this Contract or damages for costs incurred by the Contractor on any activity for which the Notice.

§ 7.1.2.2 All Contractor requests for equitable adjustment shall be submitted to Architect and Project Representative in written form. Such requests shall set forth with specificity the amount of and reason(s) for the proposed adjustment and shall be accompanied by supporting information and documents. The review, resolution, and payment of such requests shall be governed by Article 15.

§ 7.1.2.3 No adjustment of any kind shall be made to this Contract if asserted by the Contractor for the first time, after the date of final payment.

§ 7.1.2.4 The Contractor shall provide Project Representative with costs for all proposed Change Orders as outlined by the Project Representative to the Contractor at the Pre-Construction Meeting.

§ 7.1.2.5 The completion date is determined by the Owner. The schedule, however, is the responsibility of the Contractor. Time extensions for extra Work will be considered when a schedule analysis shows that the Change Order places the Work beyond the completion date stated in the Notice to Proceed. Unless the cumulative time extensions for extra Work places the Work beyond the original completion time specified in the Instructions to Bidders, all extended overhead costs are included in the overhead and profit allowance. If significant scope changes occur which places the extra Work beyond the original completion time specified in the Instructions to Bidders, actual additional costs may be considered in accordance with Article 15.

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

§ 7.1.4 Except in cases of emergency, no changes in the Work required by the Contract Documents may be made by the Contractor without having prior approval of Owner.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect or Project Representative 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.

§ 7.2.2 The inclusion of Subcontractor terms and conditions in the supporting documentation of a Change Order shall have no bearing on the contract between the Owner and Contractor, and shall not change any of the terms and conditions between the Owner and Contractor. Such supporting documentation shall not be construed as creating any expressed or implied contractual obligation of those terms and conditions between Owner and any of the Contractor's Subcontractors, suppliers or vendors.

§ 7.2.3 A Change Order may be proposed by the Architect, Contractor, or the Owner. When a Change Order is proposed, the following procedures shall apply:

- .1 If requested by Project Representative, the Contractor shall prepare and submit a detailed proposal, including all cost and time adjustments to which the Contractor believes it will be entitled if the change proposed is incorporated into the Contract. Project Representative shall be under no legal obligation to issue a Change Order for such proposal;
- .2 The parties shall attempt in good faith to reach agreement on the adjustments needed to the Contract to properly incorporate the proposed change(s) into the Work;
- .3 In some instances, it may be necessary for Owner to authorize Work or direct changes in Work for which no final and binding agreement has been reached and for which unit prices are not applicable. In such cases the following shall apply:
 - .1 Upon written request by the Owner, through a Construction Change Directive, the Contractor shall perform the proposed Work;
 - .2 The cost of such changes shall not exceed the Construction Change Directive, and be determined in accordance with subparagraph 7.2.5;
 - .3 In the event agreement cannot be accomplished as contemplated herein, the Owner may authorize the Work to be performed by Owner or to hire others to complete the Work. Such action on the part of the Owner shall not be the basis of a claim by the Contractor for failure to allow it to perform the changed Work.

§ 7.2.4 In the event Work is required due to an emergency as described in Article 7.1.4., the Contractor must request an equitable adjustment as soon as practicable, and in no case later than ten (10) working days of the commencement of such emergency.

§ 7.2.5 Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.2 shall be limited to the following:

- .1 Actual labor rate includes the base rate, taxes, insurance and fringe benefits required by agreement or custom and no Contractor markup except as allowed in 7.2.5.6 below. Unit labor is the labor time anticipated to be expended to install the corresponding unit of actual materials. Labor cost is the labor hours approved by Project Representative multiplied by the Project Representative pre-approved composite hourly labor rates;
- .2 Actual material cost is the amount paid or to be paid by the Contractor for materials, supplies and equipment entering permanently into the Work, including cost of transportation and applicable taxes. This cost shall be substantiated by the vendor or supplier's verified invoices/quotes. The cost shall not exceed the usual and customary cost for such items available in the geographical area of the project;
- .3 Large tools and major equipment are those with an initial cost greater than \$1,000, whether from the Contractor or other sources. The rental rate shall not exceed the usual and customary amount for such items available in the geographical area of the project. Tool and equipment use time allowed is only for

the extra Change Order work. Rental cost is the above tool and equipment time approved by Project Representative multiplied by the Project Representative pre-approved rental rates also described above;

- .4 The cost of performance and payment bonds are the actual rate paid by the Contractor for such bonds;
- .5 Subcontractor costs are for those subcontracted specialties required to complete the Change Order work, with maximum markups as outlined hereinafter
- .6 The maximum allowable markup for overhead and profit, by all parties of the Contractor and Subcontractors, on Change Order proposals shall not exceed 15 percent total. The Contractor markup of change order work done by Subcontractors shall not exceed 7 ½ percent; and the total combined mark-up by Contractor and Subcontractor, on Subcontractor performed work shall not exceed 15 percent. When the value of a Change Order proposal exceeds \$30,000, a declining scale will be used to negotiate the allowable combined overhead and profit margin. Where Change Order proposals involve a credit only, a reasonable allowance for overhead and profit are properly included as part of the downward adjustment for a deductive change exceeding \$15,000. The amount of such allowance is subject to negotiation.
- .7 All other Change Order expenses are part of the overhead and profit allowance which are not reimbursable as separate items and include the following:
 - .1 All costs associated with the processing of the Change Order are included in the overhead and profit allowance;
 - .2 All such efforts, unless specifically requested by as additional Work to be documented as a Change Order proposal or portion thereof, is included in the overhead and profit allowance;
 - .3 The layout required for the installation of material and equipment, and installation design, is the responsibility of the Contractor and is included in the overhead and profit allowance;

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect or Project Representative 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 Time and Material, Not To Exceed. This Not To Exceed amount will be an amount the Contractor can confidently complete the needed work within, and shall include all costs for this work including overhead and profit;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon; or
- .3 Cost method agreed upon by all signing parties.
- .4 Intentionally deleted.

§ 7.3.4

(Paragraphs deleted)

Intentionally deleted.

§ 7.3.5 Intentionally deleted.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect and Project Representative of the Contractor's agreement or disagreement

with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them.

§ 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 Intentionally deleted.

§ 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 shall be issued for all Construction Change Directives.

§ 7.4 Minor Changes in the Work

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

ARTICLE 8 TIME

§ 8.1 Definitions

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

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

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect and Project Representative 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. It is hereby understood and mutually agreed, by and between the Contractor and the Owner that the time for completion of the Work required by the Contract Documents is an essential condition of this Contract. The Contractor agrees that the Work required by the Contract Documents will be prosecuted regularly and diligently at a rate of progress that will ensure its full completion within the time specified in the Contract Documents. It is expressly understood and agreed, by the Contractor and the Owner, that the specified time period for completion of the Work described in the Contract Documents is a reasonable time for the completion of the Work, taking into consideration the average weather conditions and usual industrial conditions prevailing in the locality in which the Work is to be completed.

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

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

§ 8.2.4 Costs for acceleration of Work activities to allow completion of the Project in less time than that allowed by the Contract Documents shall be borne by the party requesting such acceleration or early completion. No claim for delay shall be valid against the Owner for compensation for delayed completion which extends completion beyond the early finish date, but which does not continue beyond the stated time for completion as set forth in the Contract.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; or (4) by other causes that the Contractor asserts, and the Project Representative determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Project Representative may determine.

§ 8.3.1.1 If any activity is delayed, or anticipated to be delayed, thereby delaying the completion of the entire Project, the Contractor shall have the right to take action as may be necessary to recapture any delay. Such action shall include, but not be limited to:

- .1 Increase in staffing;
- .2 Increase in shifts, hours of Work, or number of days of Work;
- .3 Use of available Float; or
- .4 Changing the sequence of Work activities

Costs caused by delays or improperly timed activities shall be borne by the party responsible therefore, and Change Orders, as deemed appropriate, shall be issued in accordance with Article 7 of these General Conditions.

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

§ 8.3.2.1 When events occur which, in the opinion of the Contractor, prevent completion of the Project within the time period allowed by the Contract Documents, the Contractor shall request an extension of the specified time for completion. Such request shall include the reasons for delay, the amount of time extension being requested, and any cost(s) associated with the delay. All such requests shall be made in writing and delivered to Project Representative within ten (10) working days from the beginning of such delay, or within ten (10) working days from the time when the circumstance with potential for delay becomes reasonably known to the Contractor, whichever is earlier. The Project Representative shall act on such requests as soon as practicable and notify the Contractor of Owner's decision.

§ 8.3.2.2 If the Contractor fails to complete the Work within the time specified in the Contract and such failure is due to reasons which were not beyond the reasonable control of the Contractor or if the Contractor fails to complete the Work within the time specified in the Contract and fails to make the written request as provided for in 8.3.2, then in any such event the Contractor shall pay to the Owner actual damages.

§ 8.3.2.3 If Project Representative terminates the Contract, or suspends or stops Work in accordance with 2.4 due to the fault of the Contractor, the damages described in Paragraph 8.3.2.2 shall be assessed for each day (or any part thereof) such Work is stopped on the Project. If the Owner does not elect to terminate the Contract or to suspend or stop the Work, the damages shall be assessed for each day of delay in Substantial Completion.

§ 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. The Owner may, at its discretion, waive damages due the Owner, or any portion thereof.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents. Payments to the Contractor under the Contract Documents will be made as provided for in Wis. Stat. § 16.855(19)(a), as the Work progresses on this Project. Payment requests will be processed monthly, except for special circumstances approved by Project Representative. The Contractor must perform all of the conditions required for payment and must have met the

obligations which are necessary to qualify for any partial payments. No Contractor whose Work is deficient or whose Work fails to conform to the quality standards set forth in the Contract Documents shall be entitled to interim, progress or partial payments

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

§ 9.2 Schedule of Values

As soon as practicable after the Notice to Proceed is received, but not later than submission of the first payment application, the Contractor shall submit to the Architect a schedule of values for work to be performed, as prescribed by the Contract Documents and in the detail requested by the Architect. The cost breakdown items shall reflect actual work progress stages as closely as feasible which, if approved by Architect, will become the basis for 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. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1

- .1** As a condition precedent to entitlement to payment, the Contractor shall, at the request of the Architect or Project Representative, submit satisfactory evidence to establish that the sum set forth in any Application for Payment represents the "proportionate value" of Work completed;
- .2** The Contractor shall certify each request for payment as being a true, accurate, and complete statement of account as of the date on which the certificate was made, and that the stated sums are then earned and payable to the Contractor.
- .3** All requests for payment shall be submitted to the Architect. To expedite payment of sums due under the Contract, the Contractor, Project Representative and Architect shall, where possible, jointly review any such request for payment at the site, inspecting the Work if necessary to determine the validity of the request or modifications to the request which are necessary to accurately represent the value of Work completed in accordance with the Contract Documents
- .4** The Contractor shall furnish any and all accounting records requested by the Architect or Project Representative to validate all or any part of any request for payment. The Contractor shall maintain these accounting records for a period of three (3) years from the date the Architect authorizes final payment.
- .5** The Contractor agrees to indemnify and hold the Owner harmless from all claims growing out of lawful demands of Subcontractors, laborers, workers, mechanics, material persons, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in the performance the Work required by Contract Documents.
- .6** The Contractor shall, at Project Representative or Architect's request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged, or waived.
- .7** If separate prices are set forth in the Contract Documents for identifiable items of Work, payment for such prices shall be made at the time of completion of those items of Work. Payment under this Paragraph shall be an interim payment until the time of final payment and acceptance of the Work by Architect.
- .8** Pursuant to Wis. Stat. § 16.855(19)(a), as the work progresses under this Contract for Construction the

Architect or Project Representative, from time to time, shall grant to the Contractor an estimate of the amount and proportionate value of the work properly completed, which shall entitle the Contractor to receive the amount, less the retainage, from the proper fund. The retainage shall be an amount equal to not more than 5 percent of the estimate until 50 percent of the work has been completed. At 50 percent completion, no additional amounts shall be retained, and partial payments shall be made in full to the Contractor unless the Owner certifies that the job is not proceeding satisfactorily. At 50 percent completion or any time thereafter when the progress of the work is not satisfactory, additional amounts may be retained but in no event shall the total retainage be more than 10 percent of the value of the work completed. Upon substantial completion of the work, any amount retained shall be paid to the Contractor, less the value of any required corrective work or uncompleted work. For the purposes of this section, estimates may include any fabricated or manufactured materials and components specified, previously paid for by Contractor and delivered to the work or properly stored and suitable for incorporation in the work embraced in the contract.

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

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with the requirement that it holds clear title to all property of every description which serves as the basis for the Application for Payment. Contractor warrants that title to any such property is being transferred to the Owner free and clear of all liens. If requested by the Architect or Project Representative, the Contractor shall produce satisfactory evidence of transfer of title from suppliers and Subcontractors to the Contractor, without reservation, or with adequate waiver of lien. These payments may include any fabricated or manufactured materials and components specified, previously paid for by Contractor and delivered to the site, properly stored, and suitable for incorporation into the Work embraced in the Contract; The Contractor shall identify the method of storage for such materials. Proper evidence of insurance shall be presented to protect the interest of the Owner. If payment is intended to be requested for any off-site storage items, such items shall be listed as separate lines in the request and certification for payment, cost breakdown. Architect or Project Representative, upon their request, shall be allowed to verify such materials and equipment no matter the location stored and located.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work. The Contractor shall have the sole responsibility for obtaining proper insurance on, as well as the responsibility for the care and protection of materials and Work upon which payments have been made. The Contractor shall be responsible for the restoration of any damaged Work. Nothing herein shall operate as a waiver of the rights of the Owner to require fulfillment of all of the terms of the Contract.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole 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 in the Application for Payment, that the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. 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.

§ 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 suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .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 failure to carry out the Work in accordance with the Contract Documents.

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

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

§ 9.5.4 If the Architect 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 supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment. In paying any unpaid bills of the Contractor relating to the Work, the Owner shall be deemed the agent of the Contractor, and any payment so made by the Owner shall be considered as a payment made under the Contract by the Owner to the Contractor for its account and the Owner shall not be liable to the Contractor for any such 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 Not more than seven (7) calendar days following the receipt of each payment from the Owner, the Contractor shall make payment to each and every person, Subcontractors, or entity who furnished goods or services for the progress of the Work on the Project, the value of which goods or services were included in the Contractor's Request for Payment and Certification for Payment, or who by law or Contract payment is due upon the receipt of the payment most recently received from the Owner. The Contractor shall insert a provision in all subcontracts requiring payment in the manner herein specified. The Contractor shall also require Subcontractors to include a like provision in all contracts with their subcontractors or suppliers, regardless of tier.

§ 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 suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor

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

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

§ 9.6.5.1 In the event Owner receives notice from any person, Subcontractor, or other third party, that the Contractor has failed to pay such person(s) for Work performed in accordance with the Contract Documents, the Owner shall notify the Contractor and the Contractor shall, in no more than 10 calendar days, provide all documentation Project Representative believes necessary to determine whether such payment is due, or reasons for non-payment of disputed amounts. In the event Project Representative determines the claim to be valid and payment is due, or in the absence of aforementioned documentation, Project Representative may authorize direct payment of any unpaid bills, withholding from the Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such claims until satisfactory documentation is furnished that all liabilities have been fully discharged or reasons for non-payment of disputed amounts are provided by the Contractor. In no event shall these provisions be construed to impose any obligations upon the Owner to either the Contractor or the Contractor's Surety.

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

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

§ 9.6.7.1 Pursuant to Wis. Stat. § 16.855(19)(b) and § 16.855(14m)(a) retainage on a Subcontract shall occur and be in amounts and on a schedule equal to the retainage schedule in the contract between the Contractor and the Owner.

§ 9.6.7.2 Nothing herein shall preclude the Contractor from deducting from any request for payment such amounts as will properly represent the value of Work which fails to meet the quality standards of the Contract Documents or which the subcontractor fails to complete.

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

§ 9.7 Failure of Payment

If the 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, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. In the event the Contractor elects to stop Work under this Section 9.7, upon recommencing the Work, the Contractor may seek a Change Order to assert a claim for adjustment of the Contract Time and the Contract Sum by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so 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 identifies any item, whether or not included on the Contractor's list, which is not sufficiently complete, in need of correction, or in need of replacement to be 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; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

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

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. While the Owner has such possession or use, the Contractor shall be relieved of the responsibility for loss or damage to the Work resulting from the Owner's possession or use. 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.

§ 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. The Contractor will prepare a list of items of Work remaining to be performed or corrected on those portions of the Project that the Owner intends to take possession of or use.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's 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. 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 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 provides certification that all debts and claims against this Project have either been paid in full or otherwise satisfied and give final evidence of release of all liens against the Project, the Owner, and all proceeds payable hereunder. The Contractor shall certify upon such payment request that the data contained therein is current, accurate, and complete. Contractor shall permit, if requested by Project Representative, the final inspection to be jointly conducted by the Contractor, Architect and Project Representative. The Contractor shall give Notice at least 72 hours in advance of the time set for final inspection. Upon completion of the project and before receiving final payment for work on the project, as required by law, the Contractor shall file with Project Representative an affidavit stating that the Contractor has complied fully with Wis. Stat. § 103.49(4r) and that the Contractor has received an affidavit from each of the Contractor's agents, and Subcontractors stating that they also have complied fully with Wis. Stat. § 103.49(4r).

§ 9.10.2.1 As a condition precedent to final payment, all corrective actions to remedy deficiencies in the Work required by Contract Documents and Work identified on the punch list must have been completed. In addition, where required by Contract Documents, all training of the Owner's staff in the proper operation and maintenance of the Work shall have been completed, Operating and Maintenance Manuals and Instructions as well as drawings marked up to reflect "as built" conditions must have been transmitted to Project Representative and all warranty certificates signed and presented for Project Representative acceptance.

§ 9.10.2.2 When to the satisfaction of Project Representative and Architect the Work has been completed, and is of the quality required by the Contract Documents, Project Representative may authorize payment of all sums then due the Contractor. Receipt of the final payment, as provided for herein shall constitute a waiver of any and all claims against the Owner arising out of, under, or incident to the Work performed under the Contract.

§ 9.10.2.3 If the Contractor fails to submit a request for final payment or make satisfactory arrangements with Project Representative within thirty (30) calendar days of the final inspection or accepted punch list, no further payments will be made and the Contract will be closed. The last request for Certification for Payment will be considered the final payment under the terms and conditions of the Contract.

§ 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 or Project Representative 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, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect 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 but not limited to:

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.
- .5 Any warranty or guarantee required by the Contract Documents;
- .6 Any other right surviving the Owner as to which the Contractor was specifically given notice before or during the final inspection and final payment process; or
- .7 Rights surviving to the Owner as a matter of law.

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

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

subcontractors will perform all work on the project in a safe and responsible manner. In particular, Contractor shall, at its own expense, conform to the safety policies and regulations established by the Contractor and shall comply with all specific safety requirements promulgated by any government authority, including without limitation the requirements of the Occupations Safety and Health Act of 1970 and the Construction Safety Act of 1969 and all standards and regulations which have been or shall be promulgated by the parties or agencies which administer the Acts. Contractor shall comply with said requirements, standards and regulations, and require and be directly responsible for compliance therewith on the part of its said agents, employees, materials suppliers and contractors; and shall directly receive, respond to, defend, and be responsible for all citations, assessments, fines or penalties which may be incurred by reason of its failure on the part of its agents, employees, material suppliers or subcontractors to so comply.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall strictly comply with, and bear full responsibility for, any safety procedure set forth in the Contract Documents. In the absence of such compliance, the Contractor shall be responsible for indemnification of the Owner for any cost and expense resulting from any such failure to abide by any safety procedure set forth in the Contract Documents, including legal fees. At the sole discretion of Owner, the Contractor may also be subject to termination of the Contract for default. The Contractor shall take all precautions for safety of, and shall provide all protection to prevent damage, injury, or loss to

- .1 employees on the Work and other persons who may be affected thereby (including, but not limited to the public, and the Owner's personnel and agents);
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; 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. Contractor shall have properly qualified and trained personnel on safety means and methods, and properly qualified supervision.

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

- .1 Provide appropriate safety barricades, signs, and signal lights;
- .2 Comply with any safety requirement published by any governmental authority with jurisdiction over the site, including Federal, Owner, or local jurisdictions;
- .3 Ensure that any additional measures which are reasonably necessary for the purposes stated are taken.

§ 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. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner 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. If the Owner becomes aware of any noncompliance by the Contractor or any Subcontractor, with the safety conditions of this Contract or of any condition caused by the Contractor or any Subcontractor, which poses a serious or imminent danger to the health or safety of the public or to Owner personnel, for which the Contractor has been previously notified of, and the Contractor has failed to correct, the Owner has the right stop all work until satisfactory correction action has been taken. Satisfactory correction will be at the sole

discretion of the Owner.

§ 10.2.5.1 In case of an emergency which threatens loss or injury of property, or safety of life, the Contractor will be allowed to act, without previous instructions from the Project Representative, in a diligent manner. The Contractor shall notify Project Representative immediately thereafter. Any claim for compensation by the Contractor due to such extra Work shall be promptly submitted to the Initial Decision Maker for approval as provided for in Article 7 of the General Conditions.

§ 10.2.5.2 In the event of temporary suspension of Work, or during inclement weather, or whenever Project Representative shall direct, the Contractor shall reasonably protect all Work and materials against damage or injury from the weather. This contract provision shall be incorporated into the contracts between the Contractor and Subcontractors. If, in the opinion of Project Representative, any Work or materials have been damaged or injured by reason of failure on the part of the Contractor or Subcontractors to reasonably protect the Work, such materials shall be removed and replaced at the expense of the Contractor.

§ 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, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

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

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor 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 by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 Intentionally deleted.

§ 10.3.4 Intentionally deleted.

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

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

§ 10.4 Emergencies

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

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

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located. The bond may be enforced by any person or entity who is entitled to enforce the bonds as a matter of law and who is damaged as a result of breach of these commitments by the Contractor on the Project to which these provisions apply. The Owner shall not be responsible for the default of the Contractor and the remedies of any damaged party shall be limited to an action by the damaged party against the defaulting Contractor and/or its bonding company, in addition to any other coverage for the bond.

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

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

(Paragraph deleted)

§ 11.2 The Contractor shall not commence Work under this Contract until the Contractor has obtained all the insurance required under this Contract. Such insurance must be approved by the Owner. The company providing the insurance must be lawfully authorized to do business in State of Wisconsin and/or be approved by the Owner with a minimum A.M. Best rating of B. The Contractor shall provide the following insurance:

§ 11.2.1. Worker's Compensation Insurance:

- .1 The Contractor shall procure and maintain during the life of this Contract, and shall require all Subcontractors, to maintain, Worker's Compensation Insurance as required by State of Wisconsin Statutes and any applicable Federal Act coverage such as the Longshoremen's and Harbor Workers Act, the Jones Act or the Admiralty Act for all employees engaged in Work associated with the Project under this Contract. Minimum coverage is listed in paragraph 11.2.6.

- 2 The Contractor shall procure and maintain during the life of this Contract, and shall require all Subcontractors, to maintain, Employer's Liability Insurance. Minimum coverage is listed in paragraph 11.2.6.

§ 11.2.2 Commercial General Liability Insurance and Excess Liability-Umbrella:

- 1 The Contractor shall maintain during the life of this Contract, Commercial General Liability Insurance, including Products and Completed Operations for all claims that might occur in carrying out the Contract. Minimum coverage is listed in paragraph 11.2.6. Such coverage shall be of the "occurrence" type form.
- 2 The Contractor's Commercial General Liability and Umbrella Insurance shall apply to the provisions of indemnity obligations under Section 3.18 of these General Conditions.
- 3 The Contractor shall require Subcontractors to procure and maintain Commercial General Liability Insurance and Excess Liability equal to that required in subparagraph 11.2.6. The Contractor shall require each Subcontractor, to procure and maintain Commercial General Liability and Umbrella Insurance equal to that required in subparagraph 11.2.6. However, the Contractor may insure the activities of the remaining Subcontractor(s) in the Contractor's policy. The Contractor's policy shall include coverage for Owner's Contractors.

§ 11.2.3 Auto Liability Insurance:

- 1 The Contractor shall procure and shall maintain during the life of the Contract Commercial Automobile Liability Insurance for all owned, non-owned, and hired vehicles that are used in carrying out the Contract. Minimum coverage is listed in paragraph 11.2.6.
- 2 The Contractor shall require each Subcontractor, to procure and maintain Commercial Auto Liability Insurance equal to that required in paragraph 11.2.6 of the General Conditions.

§ 11.2.4 The minimum required limits do not represent the coverage and limits necessary to protect the Contractor. The limits should not be construed in any way to limit the Contractor's liability to the Owner.

§ 11.2.5 The General Contractor and its consultants retained under the terms of this Contract, shall procure and maintain professional liability insurance providing for payment of the insured's liability for errors, omissions, or negligent acts arising out of the performance of professional services required under this Contract. Minimum coverage shall not be less than \$1,000,000 each and every claim and in the aggregate; however "unique" or "high risk" projects and/or those with Contract values over \$10,000,000 will require a minimum coverage of \$5,000,000. Professional liability insurance shall not have any exclusion for pollution and/or environmental liabilities. Professional Services as defined in the insurance policy of the Contractor, shall include, and correspond with the services as provided by the Contractor in this agreement.

§ 11.2.6 Minimum Limits Required:

At Owner's discretion, the following limits may be increase.

TYPE	Limits
Commercial General Liability	\$2,000,000 General Aggregate (applies per project) \$1,000,000 Products Aggregate \$1,000,000 Personal Injury \$1,000,000 Each Occurrence \$50,000 Fire Damage \$5,000 Medical Expense Per Person
Automobile Liability	\$1,000,000 Combined Single Limit
Excess Liability Umbrella	\$5,000,000 Each Occurrence

Init.

\$5,000,000 Aggregate

Worker's Compensation/Employers Liability Insurance

- .1 State: Statutory to all states the work is being performed;
- .2 Federal: As Applicable;
- .3 All Employees, partners, individuals, any managers on project site must be included for coverage.

TYPE	Limits
Employers Liability	\$100,000 Each Accident
Employers Liability Disease	\$100,000 Each Employee
Employers Liability Disease	\$500,000 Policy Limit

§ 11.2.7 Proof of Insurance: The Contractor shall provide a certificate of insurance to the Owner indicating coverage is in place at the limits set forth in this Article. The insurance certificate shall be provided before commencement of the Contract. If the Contractor is self-insured, audited financial records will need to be provided that clearly demonstrate the financial ability to cover losses up to the limits of insurance required. The Contractor shall also be required to disclose deductibles or Self-Insured Retention's (SIR).

§ 11.2.8 Commercial General Liability and Auto Liability carried under this Contract shall contain a provision making it primary and non-contributory to any other coverage available to the Owner.

§ 11.3 The Owner shall purchase and maintain Builder's Risk insurance in the amount of, at least, the initial Contract sum as well as subsequent modifications thereto for the entire Work at the site on a replacement cost basis.

§ 11.3.1 Property Insurance shall include insurance for physical loss or damage to the Work, temporary buildings, and equipment or material consumed in the construction of the Work.

(Paragraphs deleted)

§ 11.3.2 Off-Site and Transit Coverage: Upon the request of the Contractor and written approval of the Owner, the Property Insurance policy, subject to policy terms, definitions, and conditions, will provide a \$250,000 limit for materials and/or Work stored off the site or in transit. It is the Contractor's responsibility to insure materials and/or Work in excess of this amount. The Owner will not be responsible for materials or completed Work under the care, custody, and control of the manufacturer prior to delivery;

§ 11.3.3 Deductible: The risk of loss within the deductible amount will be borne by the Contractor;

§ 11.3.4 Loss of Use Insurance: The Owner, may maintain such property insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. Except as set forth in section 11.4.1. below, 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 covered by the Property Insurance described in subparagraph 11.3.1.

§ 11.3.5 Policy Review: A copy of the property insurance policy or policies may be obtained pursuant to the Public Records and Property Provisions of the Wisconsin State Statutes.

§ 11.4 The Owner and the Contractor waive all rights against each other and shall require its insurers to waive any rights of subrogation or recovery, for damages caused by fire or other perils to the extent covered by property insurance obtained pursuant to this Contract or other property insurance applicable to the Work. The policies shall provide such waivers of subrogation by endorsement or otherwise, except as set forth in 11.4.1 below. 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. This waiver shall be effective only to the extent any policy of insurance is not impaired thereby. This contract provision shall be incorporated into the contracts between the Contractor and Subcontractors.

§ 11.4.1 The Owner retains the right to subrogate against the Contractor and Subcontractor(s), up to \$1,000,000 per occurrence, for damage to property, including loss of use thereof, provided said property damage is to work performed by other parties and provided said Contractor's and Subcontractors', negligence contributed in any way to said damage. This contract provision shall be incorporated into the contracts between the Contractor and Subcontractors.

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 or Project Representative's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, or Project Representative, be uncovered for 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 or Project Representative has not specifically requested to examine prior to its being covered, the Architect or Project Representative may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense with no adjustment to Contract Time.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

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

§ 12.2.2 After Substantial Completion

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

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

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

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

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

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

§ 12.3 Acceptance of Nonconforming Work

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the laws of the State of Wisconsin.

§ 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. Neither party to the Contract shall assign the Contract as a whole without written consent of the other. The Owner may withhold its consent in its sole discretion. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.1.1 In case the Contractor assigns all or any part of any moneys due or to become due under this Contract, the instrument of assignment shall contain an article substantially to the effect that it is agreed that the right of the assignee in and to any moneys due or to become due to the Contractor shall be subject to prior claims of all persons, firms, and corporations for services rendered or materials supplied for the performance of the Work called for in this Contract and subject to the terms of this Contract and claims of offset by the Owner.

§ 13.2.1.2 On the date of Substantial Completion, the Contractor shall assign to the Owner all warranties and guarantees of labor or material incorporated into the Work which are provided by third party vendors, suppliers, manufacturers, and Subcontractors.

§ 13.2.1.3 Upon Substantial Completion of the Work, good title to all materials and supplies incorporated into the Work shall be conveyed to the Owner, free and clear of all liens and encumbrances.

§ 13.2.2 Antitrust Agreement. The Contractor and the Owner recognize that in actual economic practice, overcharges resulting from antitrust violations are in fact usually borne by the Owner. Therefore, the Contractor hereby assigns to the Owner any and all claims for such overcharges as to goods and materials purchased in connection with this Contract, except as to overcharges which result from antitrust violations commencing after the price is established under this Contract and any Change Order thereto.

§ 13.3 Rights and Remedies

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

§ 13.3.2 No action or failure to act by the Owner, 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 thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect and Project Representative timely notice of when and where tests and inspections are to be made so that the Architect

and Project Representative may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the 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 and Project Representative of when and where tests and inspections are to be made so that the Architect and Project Representative may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

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

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

§ 13.4.5 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.

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

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate as listed in the Standard form of Agreement Between Owner and Contractor or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.6 Reserved

§ 13.7 Reserved

§ 13.8 Nondiscrimination/Affirmative Action -

§ 13.8.1 In connection with the performance of Work under this Contract, the Contractor agrees not to discriminate against any employee or applicant for employment because of age, race, religion, color, handicap, sex, physical condition, developmental disability as defined in Wis. Stat. §51.01(5), sexual orientation, national origin, or any other basis prohibited by law. This provision shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training. Except with respect to sexual orientation, the Contractor further agrees to take affirmative action to ensure equal employment opportunities. This contract provision shall be incorporated into the contracts between the Contractor and Subcontractors.

§ 13.8.2 Contracts with a value of fifty thousand dollars (\$50,000) or more require the Contractor to submit a written affirmative action plan acceptable under Wisconsin Statutes. An exemption occurs from this requirement if the Contractor has a Work force of less than thirty (50) employees. The Contractor is responsible for obtaining affirmative action compliance from Subcontractors. Instructions on satisfying these requirements will be sent with the Notice to Proceed.

§ 13.8.3 The Contractor should establish and take appropriate initiatives to reach goals and timetables for minority and female utilization which shall be based on appropriate work force, demographic, or other relevant data which shall cover construction projects or construction contracts performed in specific geographical areas. The goals shall be applicable to the Contractor's, and Subcontractor's entire work force which is working in the area covered by the goals.

§ 13.8.4 Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom a Contractor has a collective bargaining agreement, to refer to either minorities or women shall excuse the Contractor's required initiatives under these specifications.

§ 13.8.5 The Contractor agrees to post in conspicuous places, available for employees and applicants for employment, a notice to be provided by the Owner that sets forth the provisions of this Article 13.8.

§ 13.8.6 Failure to comply with the conditions of this Article 13.8 may result in the Contractor becoming declared an "ineligible" Contractor, termination of the Contract, or withholding of payment.

§ 13.9 Minimum Wages

§ 13.9.1 The Contractor shall post, at an appropriate conspicuous point on the site of the Project, a schedule showing

all determined minimum wage rates for the various classes of laborers and mechanics to be engaged in Work on the Project under this Contract and all deductions, if any, required by law to be made from unpaid wages actually earned by the laborers and mechanics so engaged.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

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

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

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

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

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Project Representative 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 or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

The Owner may exercise any and all rights or remedies provided for herein, by law or in equity, either concurrently or singly in its sole discretion.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, three days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1** Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon secured for this project by the Contractor; and
- .2** 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 under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

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

§ 14.4 Termination by the Owner for Convenience

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

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

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

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

§ 14.4.3.1 The Contractor shall be paid for all Work performed to the effective date of termination, and any "Reimbursable Expenses" outstanding as of the date of termination. The term "Reimbursable Expenses" shall include the cost of personal property or materials which meet requirements of the Contract Documents and have been purchased by the Contractor for incorporation into the Work but not yet incorporated therein; lease payments due to an unaffiliated third party lessor for equipment provided to the Project, where the lease term extends beyond the termination date of this Contract and the Contractor is unable to terminate said lease; and other costs approved by Project Representative. Reimbursable Expenses do not include lost profits or payments due to Subcontractors for any period of time subsequent to termination of the Contract. Upon payment of the Reimbursable Expenses, the Contractor shall deliver to the Owner any materials or personal property for which said payment has been made.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

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

§ 15.1.2 Time Limits on Claims

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

§ 15.1.3 Notice of Claims

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

- .1 First, the Contractor shall present its Claim to the Initial Decision Maker who shall have twenty one (21) calendar days after presentation of the Claim to act thereon or notify the Contractor in writing of the additional time required for such action if greater than the aforementioned twenty-one (21) day period. Failure by the Initial Decision Maker to so act within the aforesaid period of time shall constitute a rejection of the Contractor's Claim;
- .2 If the Initial Decision Maker is not the Owner and the Contractor's Claim is rejected by Initial Decision Maker, the Contractor may appeal it in writing to the Owner. Any such appeal shall be made within twenty-one (21) calendar days after it is rejected by Initial Decision Maker. If no such appeal is made, the decision of Initial Decision Maker shall become final and binding and the Contractor shall waive its right to pursue the Claim further;
- .3 If the Contractor files a timely appeal of the decision of Initial Decision Maker, the Owner shall act on the Contractor's Claim within fourteen (14) calendar days or notify the Contractor in writing, of the time required for such action if greater than the aforementioned fourteen (14) day period. Failure by the Owner to so act within the aforesaid period of time shall constitute a rejection of the Claim;
- .4 If the Contractor's Claim is rejected by the Initial Decision Maker, the Contractor shall, as a condition precedent to filing suit against the Owner, comply with resolution procedures set forth in Wisconsin statutes.

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

§ 15.1.4 Continuing Contract Performance

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

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker. The Owner and the Contractor shall act in good faith to efficiently and fairly resolve Claims and disputes arising under the Contract in order to avoid wherever possible, formal legal proceedings.

§ 15.1.5 Claims for Additional Cost

It is recognized by the Owner and Contractor that performance of the Owner's duties may require or cause the interruption or suspension of the Work for periods other than the reasonable time allowed under 2.4. If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5.1 In the event of such interruption or suspension, the Owner and the Contractor shall negotiate in good faith in an effort to agree upon the additional construction costs and other amounts, if any, that shall be paid the Contractor because of the interruption or suspension of Work. Anything in the Contract Documents to the contrary notwithstanding, however, it is expressly understood and agreed that:

- .1 The total amount recoverable by and payable to the Contractor shall be limited to an amount equal to the sum of the additional construction costs and other amounts actually incurred by the Contractor because of the Owner's actions and omissions; plus a maximum overhead and profit allowance equal to fifteen (15) percent of the sum of additional construction costs and other amounts.
- .2 Overhead costs for extended or unabsorbed overhead shall not be used as the basis for calculating or determining the amount of any additional construction costs or other amounts recoverable by or payable to the Contractor; and
- .3 By entering into this Contract with the Owner, the Contractor hereby waives any rights that it otherwise might have to pursue recovery of overhead costs for extended or unabsorbed overhead from the Owner.

§ 15.1.6 Claims for Additional Time

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

- .1 Where, under the Contract, Initial Decision Maker extends the amount of time specified for completion of the Project, the new time limit fixed by such extension shall be the essence of this Contract.
- .2 Time extensions and associated adjustments in the Contract Documents which are implemented by, or based on Change Orders for which an overhead allowance would otherwise be permitted hereunder, shall not include any allowance for extended and unabsorbed overhead costs.
- .3 Permitting the Work or any part of it to continue after the time fixed for its completion, or after the date to which the time for completion may have been extended, shall in no way operate as a waiver on the part of the Owner, of any of the Owner's rights under the Contract or a waiver of any default by the Contractor.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction. A determination on a Claims in accordance with 15.1.6.2 shall only be made by the Initial Decision Maker upon written request by the Contractor. Not all extension(s) in the allowable time for completion, when granted by Initial Decision Maker, will result in additional compensation to the Contractor.

(Paragraphs deleted)

§ 15.2 Initial Decision

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

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks

sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

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

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

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties 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.

§ 15.2.6 Intentionally deleted.

§ 15.2.6.1 Intentionally deleted.

§ 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 Litigation

§ 15.3.1 Any judicial action relating to the construction, interpretation, or enforcement of the Contract Documents including without limitation, the Contractor's claims, demands, and causes of action for additional construction costs, delay damages, and other amounts owed hereunder, shall be brought and venue in the Dane County Circuit Court in Madison, Wisconsin. The Contractor hereby consents to personal jurisdiction in that venue, and waives any defenses that the Contractor otherwise might have relating thereto.

§ 15.3.2 The Contractor hereby waives its right to a jury trial in connection with any judicial action or proceeding that may arise by and between the Owner and the Contractor concerning the construction, interpretation, or enforcement of the Contract Documents including, without limitation, any claims, demands, or causes of action that the Contractor hereafter may assert against the Owner for additional construction costs, delay damages, and other amounts.

(Paragraphs deleted)

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SECTION 01000 - GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

Furnish all required labor, equipment, and materials to complete all work in accordance with the drawings and specifications.

1.2 DEFINITIONS

Whenever the specifications require approval or selection of any item, it shall be construed to mean approval or selection by the Architect. Whenever the specifications require submittal of reports or certifications, it shall be construed to mean submitted to the Architect.

Approvals made by the Owner prior to final project inspection and acceptance do not relieve the Contractor from his obligation to perform the work in accordance with the specifications and drawings. These approvals do not prohibit the Owner from subsequently asserting any other contract rights under this contract.

A. Locations of Work

The work to be performed is at the following location: Paragould, Arkansas.

B. Principal Features

The work to be performed includes site clearing, grading, paving, drainage, etc.

1.4 SUBMITTALS

A. Product Data

Submittals shall be furnished to ETC Engineers & Architects, Inc. 1510 South Broadway, Little Rock, Arkansas. 72202 RE: Farmers Market, no later than 15 days after contract award, prior to the installation of the submitted materials and equipment. Submittals shall be approved by the Engineer, in writing, prior to the installation of the submitted materials and equipment. A seven day review period may be anticipated upon receipt of Contractor furnished submittals to the Engineer.

Submittals shall include shop drawings, certifications, manufacturer's literature, samples, etc., sufficient in detail to show full compliance with this contract document.

Contractor shall mark all submittals to show specific equipment or materials to be furnished under this contract.

If shop drawings show variations from the contract requirements, the Contractor shall, in writing, describe such variations and the reasons therefore, separate from the drawings, at the time of submittal.

In lieu of the label or listing of a specified agency (UL, FM, etc.) a written certificate from an approved, nationally recognized testing organization may be submitted. The testing organization shall be equipped to perform such services and shall certify that the items have been tested and conform to the requirements and testing methods of the specified agency.

- B. Product Format
Submittals shall consist of two separately bound copies, placed in a hard cover binder, with each technical section separated by tabbed dividers. The dividers shall be keyed to an index inserted in the front of the binder.

Three copies of the submittal will be returned to the Contractor after the Engineer has reviewed it.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Access to Sites
Access to the sites will be from 6:30 A.M. to 5:30 P.M., Monday through Friday, unless other arrangement agreed upon with the site manager.
- B. Excavation
Prior to start of the work, the contractor must contact utility companies. Any work without authorization to excavate will be shut down.
- C. Protection
The Contractor shall provide signs, barriers, and barricades to provide a safe work area.

1.6 PRE-FINAL DEFICIENCY LIST

- A. All work shall be coordinated with ETC Engineers & Architects, Inc. at (501) 375-1786
- B. Prior to the completion of the work, the Owner/Architect will furnish to the Contractor a list of all known project deficiencies. All deficiencies shall be corrected by the Contractor prior to final payment.
- C. Owner, Architect, or his authorized representative, will conduct the final inspection and certify completion of the project to the Owner.

PART 2 PRODUCTS (Not applicable)

PART 3 EXECUTION (Not applicable)

END OF SECTION

SECTION 01010 - SUMMARY OF WORK AND PROCEDURES

1.01 DEFINITIONS

- A. Contractor: The Party of the first part of the contract
- B. Owner: City of Paragould
301 West Court
Paragould, AR 72450
- C. Architect: ETC Engineers & Architects, Inc.
1510 So. Broadway
Little Rock, Arkansas 72202

1.02 FORM OF AGREEMENT

The "Standard Form of Agreement" A.I.A. Document A-101 shall be the Form of Agreement between Contractor and Owner. The Agreement takes place over all other Contract Documents.

1.03 NOTICE TO PROCEED

Do not begin work prior to receipt of written Notice to Proceed authorizing performance of the Contract for each Project.

1.04 PAYMENTS TO CONTRACTOR

- A. Partial payments to include the value of materials delivered to site and labor executed shall be paid by Owner to Contractor in monthly installments upon Architect's certificate as work progresses in proportion to amount of work executed during monthly period, and in accordance with Article 9, Supplementary Conditions.
- B. Deliver six (4) copies of monthly application for payment to Architect. Include six (4) copies of the updated Progress Schedule with Payment Request.
- C. After payment, submit receipted invoices from all Subcontractors and Material Suppliers, certifying that payment has been made in full, less 10%.

1.05 PROGRESS SCHEDULE

Submit copies of Progress Schedule in accordance with Section 01300, Submittals & Substitutions.

1.06 CONSTRUCTION DOCUMENTS

The Contractor is to supply all contract drawings and specifications to his subcontractors or material suppliers. Additional sets or portions of contract drawings and specifications requested by the Contractor will be furnished for actual cost of printing at the Contractor's expense.

1.07 ORDERS FOR MATERIALS

- A. Place material orders within ten (10) days after execution of Contract. Furnish evidence of orders to Architect upon request.
- B. Place orders contingent upon selection of colors and finishes, approval of shop drawings and samples by Architect.
- C. Include with monthly request for payment and progress schedule a report of materials purchased and date materials are scheduled for delivery.

1.08 SUBSTITUTIONS OF MATERIAL, EQUIPMENT OR METHODS

Proposals for substitutions of material, equipment or methods shall be submitted no later than thirty (30) days from date of written Notice to Proceed authorizing performance of the Contract.

1.09 SUBCONTRACTOR LIST

Submit list of proposed Sub-contractors to Architect in accordance with Article 5, Supplementary Conditions. Do not award any Sub-contract without Architect's prior approval. This list does not refer only to subcontractors named in the Bid Form. It should include all of the subcontractors.

1.10 GUARANTEES

- A. Guarantee all work to be free from defects in materials and workmanship for a period of one (1) year from date of authorization of final settlement except where a different time period is specifically prescribed.

- B. When, at any time during the guaranty period, work is considered defective by either Owner or Architect, immediately:
 - 1. Place such defective work into satisfactory condition, free from faults and defects and in conformance with Contract requirements.
 - 2. Make good all damage to work, including contents thereof and grounds, developing within guaranty period when such damage is due to use of materials and labor not conforming to Contract requirements.
 - 3. Make good all work disturbed in fulfillment of Contract obligations during guaranty period. If work of other contractors is disturbed in the process of fulfilling Contract, restore such work to its original condition and guarantee such restored work.
- C. Upon failure by Contractor to proceed promptly to comply with terms of any guaranty under the Contract, Owner shall have such work performed as necessary to fulfill guarantees, and Contractor shall pay Owner such sums as expended to fulfill such guaranty.
- D. Work required for fulfillment of guarantees embraced under the Contract shall be performed at no additional expense to Owner.

1.11 CONTRACT TIME

Perform all work necessary to bring entire Contract, Base Bid work, and its individual Projects, to state of final completion in not more than the time listed in the Bid Form.

1.12 WORK PERFORMED BY OWNER

- A. Owner Furnished, Contractor Installed Items:
 - 1. The Owner will purchase and deliver item to site. The Contractor shall unload, uncrate, assemble, and provide utilities and hook-up, as required for complete and operational installation.
 - 2. Refer to plans for items that are Owner Furnished, Contractor Installed:

1.13 COORDINATION

- A. Provide administrative and supervisory requirements necessary for coordination of work, including meetings, administrative and supervisory personnel, survey, records, reports, limitations for use of site, installation provisions, cutting and patching, cleaning, protection, conservation, and salvage. Coordinate work with work performed by Owner, including storage of materials and equipment, and connections and execution of work.

END OF SECTION

SECTION 01020 - SPECIAL CONDITIONS

- 1.01 **GENERAL:** The GENERAL CONDITIONS form a part of this Section.
- 1.02 **EXAMINATION OF SITE:**
- A. Each bidder shall visit the site of the work compare the Drawings and Specifications with any work in place and inform himself of all conditions. Failure to visit the site will in no way relieve the successful bidder from necessity of furnishing materials or performing any work that may be required to complete work in accordance with Drawings and Specifications, without additional cost to the Owner.
 - B. Take special care to verify all existing conditions, elevations, lines and dimensions. Prior to submitting bids or commencing work, report any dimensional variations, discrepancies, obvious omissions, or other conditions materially affecting performance of the work in accordance with requirements indicated in Drawings and Specifications.
- 1.03 **PROJECT LIMITS:** The Contractor shall confine his operation, other than work required in the installation of utilities, drainage, etc., to the area indicated on the plans.
- 1.04 **CODES:** All work shall be performed to meet the requirement of applicable local, state and national codes and other agencies having jurisdiction.
- 1.05 **PROTECTION:** Protect work from injury due to weather, frost, dampness, accident and other like causes.
- 1.06 **TEMPORARY JOB OFFICES:**
- A. The Contractor shall furnish and maintain:
 - 1. A job office to accommodate Contractor and Architect. Substantially construct with floors above grade. Provide heat, light, and ventilation. A suitable travel trailer may be substituted in lieu of job constructed office space. Locate as directed by the Owner.
 - B. Maintain on file in job office: Copies of Drawings, and Specifications, supplemental drawings or data, shop drawings, approved samples, records pertinent to project.

- C. Do not store tools, materials, supplies and equipment in job office.
 - D. Telephone and Facsimile: Provide telephone and fax in the field office. Pay costs for temporary service.
- 1.07 STORAGE SHEDS: Provide temporary, substantially constructed, dampproof storage sheds for materials and tools. Locate as directed.
- 1.08 SANITARY FACILITIES: Contractor shall provide temporary toilets, as required.
- 1.09 UTILITIES:
- A. Make necessary arrangements for all temporary and permanent electric services for lighting and power as required. The Contractor shall coordinate with all local utility companies for utilities to be relocated during construction.
 - B. Provide temporary and permanent water, gas, and sewer connections as required.
 - C. Refer to Mechanical and Electrical plans and specifications for additional information concerning construction utilities.
 - D. The Contractor shall pay all fees associated with temporary and permanent utility connections.
- 1.10 LAYING OUT WORK:
- A. Employ a civil engineer to lay out the work. Verify grades, levels and dimensions indicated on Drawings. Report any errors or inconsistencies to Architect in writing before commencing work.
 - B. Provide and maintain well built batterboards at all corners of new construction, establish bench marks at not less than two widely separated locations, locate all general reference points and take such action necessary to prevent their destruction.
 - C. Employ a professional Civil Engineer or Land Surveyor registered in the State of Arkansas, and approved by the Architect, to confirm or define site boundaries and/or building lines. Erect substantial bench marks and preserve them throughout the work.
- 1.11 BARRICADES AND SIGNS:

- A. Provide and maintain lights, public barriers, and barricades, as required for protection of persons and property in accordance with local codes and good safety practices. The Contractor is solely responsible for the safety on the project.
- B. Provide and maintain such signs required by safety regulations and necessary to safeguard life and property.

1.12 RESPONSIBILITIES OF CONTRACTOR:

- A. Except as otherwise specifically stated in the Contract, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, heat, power, transportation, superintendence, permits, fees, temporary construction of every nature, taxes legally collectible because of the work and all other services and facilities of every nature whatsoever necessary to execute the work to be done under the contract and deliver it complete in every respect within the specified time.
- B. If work is required in a manner to make it impossible to produce first class work, or should discrepancy appear among Contract Documents, request interpretation before proceeding with work. If Contractor fails to make such request, no excuse will thereafter be entertained for failure to carry out work in a satisfactory manner.
- C. Should conflict occur in or between Drawings and Specifications, the Contractor is deemed to have estimated on more expensive way of doing work unless he shall have asked for and obtained a written decision before submission of Proposal as to which method of materials will be required.

1.13 FILE DRAWINGS: At the completion of this project, the General Contractor shall furnish to the Architect, and to the Owner, a complete file of the final copies of all shop drawings used in the construction of this project.

1.14 COORDINATION: In the interest of expediting the Work, it shall be the responsibility of the Contractor to coordinate the work of all trades. The Contractor shall increase his forces, work overtime, or take other measures necessary in order to protect the work or complete certain portions of the work within the established time for the Project at no additional cost to the Owner under the Base Contract.

- A. Provide administrative and supervisory requirements necessary for coordination of work, including meetings, administrative and supervisory personnel, survey, records, reports, limitations for use of site, installation provisions, cutting and patching, cleaning, protection, conservation, and salvage.

- B. 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 its 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.
- C. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.

Prepare similar memoranda for the Owner and separate contractors where coordination for their work is required.
- D. Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of schedules.
 - 2. Installation and removal of temporary facilities.
 - 3. Delivery and processing of submittals.
 - 4. Progress meetings.
 - 5. Project close-out activities.
- E. Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water and materials.

- F. Coordinate work with work performed by Owner and separate contractors, including storage of materials and equipment, and connections and execution of work.
- 1.15 ASSIGNMENT OF WORK: The terms "this Contractor" and "this Sub-Contractor" have not been used in this Specification. Whenever the term "Contractor" is mentioned within this Specification, it shall not be interpreted to imply that work required of various sub-contractors is assigned to other sub-contractors of the General Contractor.
- 1.16 ELECTRICAL LICENSE REQUIREMENT:
- A. No person shall perform electrical work on the contract without possessing an Arkansas State Master or Journeyman License from the Arkansas State Electrical Examiners Board. All electrical work and apprentice electricians shall be supervised by a Master or Journeyman Electrician on a one-to-one ratio.
 - B. All electricians shall have a copy of their license with them and shall be required to show it to an appropriate inspector upon request.
- 1.17 INSPECTION: The Contractor awarded this project agrees to allow any Federal or State Inspector, acting in their official capacity, to have access to the job site.
- 1.18 CERTIFICATIONS: Provide all required certifications for all systems as required in the Contract Price, including but not limited to mechanical, electrical, plumbing.
- 1.19 SUPERINTENDENT: Prior to start of work, the Contractor shall submit in writing to the Architect/Owner, the qualifications of the Superintendent for approval. If the Architect/Owner finds the Superintendent is unacceptable for any reason, the Contractor shall provide one which is acceptable.
- 1.20 INDUSTRY STANDARDS:
- A. Applicability of Standards: Except where more explicit or stringent requirements are written into the contract documents, applicable construction industry standards have the same force and effect as if bound into or copied directly into the contract documents. Such industry standards are made a part of the contract documents by reference. Individual specification sections indicate which codes and standards the Contractor must keep available at project site for reference.
 - B. Publication Dates: Except as otherwise indicated, where compliance with an industry standard is required, comply with standard in effect as of date of contract documents.

- C. **Conflicting Requirements:** Where compliance with two or more standards is specified, and where these standards establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the contract documents specifically indicate otherwise. Refer to requirements that are different, but apparently equal and uncertainties as to which quality level is more stringent to the Architect for decision before proceeding.
 - D. **Copies of Standards:** The Contract Documents require that each entity performing work be experienced in that part of the work being performed. Each entity is also required to be familiar with industry standards applicable to that part of the work. Copies of applicable standards are not bound with the contract documents. Where copies of standards are needed for proper performance of the work, the Contractor is required to obtain such copies directly from the publication source.
 - E. **Abbreviations and Names:** Trade association names and titles of general standards are frequently abbreviated. Where acronyms or abbreviations are used in the specifications or other contract documents they are defined to mean the recognized name of the trade association, standards generating organization, governing authority, or other entity applicable to the context of the text provisions.
-
- 1.21 **CONSTRUCTION AIDS:** Provide and maintain for the duration of construction temporary equipment and apparatus including scaffolds, elevators and hoists, canopies, tarpaulins, barricades, warning signs, steps, ladders, platforms, ramps, chutes, and other temporary construction aids and miscellaneous facilities as necessary for proper completion of the work; comply with pertinent safety regulations.
 - 1.22 **TEMPORARY HEAT:** Provide temporary heat where indicated and where needed for the proper performance of work, for curing or drying of work recently installed, and protection of work in place from, adverse effects of low temperature.
 - 1.23 **DEWATERING AND SNOW AND ICE REMOVAL:** Maintain site, excavations, and construction free of water, snow and ice, as necessary for protection and execution of the work. Comply with dewatering requirements specified in Division 2 Specification Sections; where feasible, utilize same facilities.
 - 1.24 **TEMPORARY FIRE PROTECTION:** During construction period and until fire protection needs are fulfilled by permanent facilities, provide and maintain types and forms of temporary fire protection needed to protect facilities against fire losses. Store combustible materials in recognized fire-safe locations and containers.

- 1.25 **SECURITY:** Provide sufficient control to prevent illegal entry or damage during nights, holidays, or other periods when work is not being executed, and such other controls as required during working hours.
- 1.26 **RODENT CONTROL:** Institute an effective program of rodent control. Provide marked metal containers for edible rubbish and enforce their use by employees. Empty containers and remove contents from site as often as required to maintain an adequate rodent control program. If this program of rodent control is not effective, additionally provide for regular services of an experience exterminator who shall visit the site at least once a month for entire construction period.
- 1.27 **REMOVAL:** Maintain construction facilities and temporary controls as long as needed for safe and proper completion of work. Remove temporary facilities and controls as rapidly as progress of work will permit or as directed by Architect.

END OF SECTION

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SECTION 01030 - ALLOWANCES

PART 1 - GENERAL

- 1.01 SCOPE: The Contractor shall include in Contract Sum all Allowances stated in the Contract Documents.

The Contractor shall include in the Base Bid all allowances named in the Contract Documents and shall cause the work so covered to be done by such contractors and for such sums as the Architect may direct, the Contract Sum being adjusted in conformity therewith. The Contractor declares that the Contract Sum include such sums for expenses and profit on account of cash allowances as he deems proper. No demand for expenses or profit other than those included in the Contract Sum shall be allowed.

1.02 SCHEDULE OF ALLOWANCES

- A. Allowance No. 1: Include the sum of Five Thousand Dollars (\$7,5000) for additional Class 7 Gravel for the Gravel Parking Area. This allowance is for the cost of material supplied on site including tax, profit and overhead. Cost of labor and equipment for placing and compaction shall be included in the lump sum base bid.
- B. Allowance No. 2: Include the sum of One Thousand Five Hundred Dollars (\$1,500.00) for the design, shop drawings, purchase, taxes, freight, delivery, and installation of all interior signage for this project. (Handicapped parking signs, parking stripes and painted directional arrows are included in the Site work bid.) This allowance shall be for a turn-key process from design through installation.
- C. Allowance No. 3: Include the sum of Two Thousand Five Hundred Dollars (\$2,500) for the design, shop drawings, purchase, taxes, freight, delivery, and installation of exterior cast Aluminum letters for Building sign and interior building plaque for this project. This allowance shall be for a turn-key process from design through installation.

- 1.03 ADJUSTMENTS OF COSTS: If the costs are more or less than the specified amount of Allowance, the Contract Sum will be adjusted accordingly by change order.

- 1.04 Allowance shall not be made a part of any subcontract agreement by Contractor until all materials stipulated have been selected by Architect.

END OF SECTION

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SECTION 01200 - PROJECT MEETINGS

1.01 PRE-CONSTRUCTION MEETING:

- A. Architect will schedule and administer a pre- construction meeting within 15 days after date of Notice to Proceed.
- B. Location: A central site, convenient for all parties.
- C. Attendance:
 - 1. Owner's Representative.
 - 2. Architect and his professional consultants.
 - 3. Contractor's Superintendent.
 - 4. Major Subcontractors.
 - 5. Others as appropriate.

1.02 PROGRESS MEETINGS:

- A. Contractor shall schedule regular periodic meetings, as required by progress of the work.
- B. Location of the meetings: The project field office of the Contractor.
- C. Attendance:
 - 1. Architect and his professional consultants as needed.
 - 2. Subcontractors and suppliers as appropriate to the agenda.
- D. Representative of contractors, subcontractors and suppliers attending the meetings shall be qualified and authorized to act on behalf of the entity each represents.
- E. Architect may attend meetings to ascertain that Work is expedited consistent with Contract Documents and the construction schedules.

END OF SECTION

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SECTION 01300 - SUBMITTALS

PART 1 - GENERAL

- 1.01 SCOPE: Provide all submittals, including shop drawings, product data, samples, schedules, reports, and requests for substitutions, as required by the Bidding and Contract Documents and in strict accordance with the provisions of this section.
- 1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS:
- A. Contractual Requirements for Submittals:
 - Section 00700: General Conditions
 - Section 00800: Supplementary Conditions
 - B. Individual Submittals Required: Pertinent sections of these specifications.
 - C. Contract Close-out: Section 01700

PART 2 - PRODUCTS

- 2.01 SHOP DRAWINGS:
- A. Submit required shop drawings drawn to a scale sufficiently large enough to show all pertinent features of the item and its method of connection to the Work. Submit related shop drawings together; partial submittals will not be accepted. Provide manufacturer's name and model number of prefabricated items and indicate methods of attachment and clearances required relative to other trades affecting all elements of the Work. Identify deviations from the Contract Documents (if any), check dimensions, check that trades have been coordinated and that no conflict will develop in this installation. Notify the Architect in writing of any errors or deviations at the time of submittal. Any dimensional or coordination problems which surface during construction due to lack of coordination by the General Contractor will be corrected at the Contractor's expense. After reviewing the shop drawings, indicate Contractor's approval by signing and dating on Contractor's stamp. The use of stamps which pass on responsibility to subcontractors will not be allowed. The General Contractor is responsible for review and coordination of all aspects of the work, and shall indicate that submittals have been reviewed for dimensions and coordination of all subcontractor work. Failure to follow these procedures will result in rejection of the submission and no additional contract time will be allowed for delay of this cause.

- B. Submit one transparency and one print of Contractor's stamped and approved shop drawings for Architect's review. The Architect will review the transparency, and stamp it with indication of action as appropriate. The Architect will retain the print for his record, and will return the transparency to the Contractor. For transparencies marked "Revise and Resubmit, Rejected", correct the original drawings, make a new transparency reproduction and print, and resubmit. For transparencies returned "Reviewed, Furnish as Corrected", provide such number of prints of the transparency as may be needed for field distribution.
- 2.02 **PRODUCT DATA AND SAMPLES:** Submit three (3) copies of product data for Architect's review for items specified in the various specification sections (five copies required for mechanical and electrical data). Submit samples, where specified, along with product data. Mark data clearly to indicate exact items submitted, and note deviations from Contract Documents (if any). After reviewing the submittals, indicate approval by signing and dating on Contractor's stamp, and submit to the Architect for review.
- 2.03 **PROGRESS SCHEDULE:**
- A. Prior to signing the Contract, submit to the Architect a bar chart progress schedule indicating a time for each trade for operation of Work to be performed at the site. Chart shall demonstrate planned Work, properly sequenced and intermeshed and all critical dates to complete work, for expeditious completion of Work. Indicate all critical dates for Owner furnished items, either Owner installed or General Contractor installed. Identify phases if required. Contractor's schedule shall become a part of the Contract.
 - B. Submit with application for payments monthly updates of the schedule accurately depicting actual progress to the first day of the month. Indicate percentage of completion on the time bars at 10% increments.
- 2.04 **SCHEDULE OF VALUES:** Submit a schedule of values on AIA Document G703 (Continuation Sheet for G702). Itemize separate line cost for each major item of Work and each subcontracted item of Work (use Sections under Division 2 through 16 in Table of Contents as a basis for listing).
- 2.05 **APPLICATION AND CERTIFICATE FOR PAYMENT:** Submit Application and Certificate for Payment on AIA Document G702 and G703. Refer to Section 01370, Schedule of Values, Part 2, Paragraph A.
- 2.06 **MANUAL:** Upon completion of the Work and prior to final payment, submit to the Architect a loose-leaf hard cover binder with the project name printed on it, containing five indexed sections as follows:

- A. Subcontractors: A listing of all subcontractors for the project, including portions of the Work done, address and telephone number of the firm, and contact at the firm familiar with the project.
 - B. Guaranties and Warranties: One fully executed copy of each guaranty and warranty specified.
 - C. Certificates: One fully executed copy of each certificate specified.
 - D. Instructions: One operating, service, and maintenance manual or instruction sheet for each item specified.
 - E. List of As-Built Drawings, Record Drawings, Shop Drawings, Product Data, and Samples.
- 2.07 DRAWINGS AND SUBMITTALS PACKAGE: Upon completion of the Work and prior to final payment, submit to the Architect a package labeled with the project name and containing one copy of all final record drawings, specifications, shop drawings, product data, and samples (see AIA A201 paragraph 3.11.1). This package and the manual will be presented by the Architect to the Owner upon completion of the project.

PART 3 - EXECUTION

- 3.01 IDENTIFICATION OF SUBMITTALS: Completely identify each submittal and resubmittal by showing at least the following information. Submittals not properly identified are subject to return without review.
- A. Name and address of submitter, plus name and telephone number of the individual who may be contacted for further information.
 - B. Name of project as it appears in these specifications.
 - C. Drawing number and specifications section number to which the submittal applies.
 - D. Number each submittal consecutively.

END OF SECTION

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SECTION 01310 - SUBSTITUTION REQUEST FORM

Mail to: ETC Engineers & Architects, Inc.
1510 South Broadway, Little Rock, Arkansas
Phone: 501-375-1786 Fax: 501-375-1277

SECTION _____ PARAGRAPH _____ SPECIFIED ITEM: _____
PROPOSED SUBSTITUTE: _____

Attach complete description, designation, catalog or model number, SpecData Sheet, and other technical data, including laboratory tests, if applicable.

Fill In Blanks Below:

1. Will substitution affect dimensions indicated on Drawings?

2. Will substitution affect wiring, piping, ductwork, etc., indicated on Drawings?

3. What affect will substitution have on other trades?

4. Differences between proposed substitutions and specified items?

5. If necessary, will the undersigned pay for Archtiect's cost, required to revise working drawings, caused by substitution?

6. Manufacturer's warranties of specified items and proposed items are: ☐ Same ☐ Different (explain)

7. Does substitution come in same colors, patterns, etc., as specified item, if applicable?

Submitted By: _____

Signature: _____

Firm: _____

Date: _____

Address: _____

Telephone: _____

Fax: _____

Farmers Market
Paragould, Arkansas

ETC Project Number 200301CPAG

REVIEW COMMENTS:
(Architect's Use Only)

- ☐ Accepted
- ☐ Accepted As Noted
(see attached copy)
- ☐ Not Accepted
- ☐ Received Too Late

By: _____

Date: _____

Remarks:

SECTION 01370 - SCHEDULE OF VALUES

PART 1 - GENERAL

- A. Prior to the first Application for Payment Contractor shall submit to the Architect, an expanded Schedule of Values which will define labor and material separately for each significant portion of the work to be performed.
- B. Upon request of the Architect, Contractor shall support the values with date, which will substantiate their correctness.
- C. The Schedule of Values, unless objected to by the Architect, shall be used only as the basis for the Contractor's Applications for Payment.

PART 2 - FORM AND CONTENT OF SCHEDULE OF VALUES

- A. Submit schedule of AIA Document G703, Contractor's standard forms and automated printout will be considered for approval by Architect upon Contractor's request.
- B. Schedule shall list the installed value of the component parts of the Work in sufficient detail to serve as a basis for computing values for progress payments during construction.
- C. Follow the table of contents of this Project Manual as the format for listing component items. Identify each line item with the number and title of the respective major section of the specifications.
- D. For each major line item list sub-values of major products or operations under the item.
- E. For items on which progress payments will be requested for stored materials, break down the value into:
 - 1. The cost of the materials, delivered and unloaded, with taxes paid.
 - 2. The total installed value.
- F. The sum of all values listed in the schedule shall equal the total Contract Sum.

END OF SECTION

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SECTION 01400 – QUALITY CONTROL

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. The Contractor shall employ and pay for the services of an independent testing laboratory to perform specified testing, except where designated otherwise in the Specification Sections.
- B. Testing laboratory services are required for, but are not necessarily limited to, the following:
 - 1. Soil testing and compaction control.
 - 2. Cast-in-place concrete: Curing and testing of molded cylinders.
 - 3. Concrete paving: Density of compacted base for paving.

1.02 RELATED WORK:

- A. Related requirements in other parts of the Project Manual:

Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities: General Conditions of the Contract.
- B. Related requirements specified in other sections:
 - 1. Certification of products: The respective sections of Specifications.
 - 2. Test, adjust and balance of equipment: The respective sections of Specifications.
 - 3. Laboratory tests required, and standards for testing: Each specification section listed.

1.03 QUALITY ASSURANCE:

- A. The testing laboratory employed by the Owner will meet "Recommended Requirements for Independent Laboratory Qualification" published by the American Council of Independent laboratories.

- B. In its work on this project, the testing laboratory will be required to meet the basic requirements of ASTM E 329, "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction".

1.04 SUBMITTALS:

Submit written report of each test and inspection to the following:

- A. Architect/Engineer.
- B. Contractor.
- C. Project Record file at job site.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 DUTIES OF TESTING LABORATORY:

- A. Cooperate with Architect and Contractor; provide qualified personnel after due notice.
- B. Perform specified inspections, sampling and testing of materials and method of construction:
 - 1. Comply with specified standards.
 - 2. Ascertain compliance of materials with requirements of Contract Documents.
- C. Promptly notify Architect and Contractor of observed irregularities or deficiencies of work or products.
- D. Promptly submit copies of the written report of each test and inspection as required in Article 1.04 above.

3.02 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY:

- A. The testing laboratory is not authorized to:

1. Release, revoke, alter or enlarge on the requirements of the Contract Documents.
2. Approve or accept any portion of the Work.
3. Perform any duties of the Contractor.

3.03 CONTRACTOR'S RESPONSIBILITIES:

- A. Cooperate with laboratory personnel and provide access to the Work and to Manufacturer's Operations.
- B. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.
- C. Provide to the laboratory the proposed design mix to be used for concrete and other material mixes which require control by the testing laboratory.
- D. Furnish copies of Products test reports as required.
- E. Furnish incidental labor and facilities:
 1. To provide access to the Work to be tested.
 2. To obtain and handle samples at the Project site or at the source of the product to be tested.
 3. To facilitate inspections and tests.
 4. For storage and curing of test specimens.
- F. Notify the laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.
- G. Provide all required time within the construction schedule for the testing laboratory to perform its tests and to issue each of its findings.
- H. Provide at the site three extra standard test cylinder molds for emergency use.

END OF SECTION

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SECTION 01410 - ENVIRONMENT PROTECTION

1.1 GENERAL REQUIREMENTS

The Contractor shall perform the work minimizing environmental pollution and damage as the result of construction operations. Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the utility of the environment for aesthetic, cultural and/or historical purposes. The control of environmental pollution and damage requires consideration of land, water, and air, and includes management of visual aesthetics, noise, solid waste, as well as other pollutants. The environmental resources within the project boundaries and those affected outside the limits of permanent work shall be protected during the entire duration of this contract.

A. Subcontractors

The Contractor shall ensure compliance with this section by subcontractors.

B. Environmental Protection Plan

The Contractor shall submit an environmental protection plan within 15 days after receipt of the notice to proceed. Approval of the Contractor's plan will not relieve the Contractor of responsibility for adequate and continuing control of pollutants and other environmental protection measures. The environmental protection plan shall include, but shall not be limited to, the following:

1. Location of the solid waste disposal area.

C. Stormwater Pollution Prevention Plan

The contractor shall provide and comply with stormwater pollution plan developed by Engineer. (Not included in this contract.)

D. Permits

The Contractor shall obtain all needed permits or licenses. The Contractor shall be responsible for implementing the terms and requirements of the appropriate permits as needed and for payment of all fees.

E. Notification

The Architect/Engineer will notify the Contractor in writing of any observed noncompliance with the previously mentioned Federal, State or local laws or regulations, permits, and other elements of the Contractor's environmental protection plan. The Contractor shall, after receipt of such notice, inform the Architect/Engineer of proposed corrective action and take such action when approved. If the Contractor fails to comply

promptly, the Architect/Engineer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions shall be granted or costs or damages allowed to the Contractor for any such suspensions.

F. Litigation

If work is suspended, delayed, or interrupted due to a court order of competent jurisdiction, the Architect/Engineer will determine whether the order is due in any part to the acts or omissions of the Contractor, or subcontractors at any tier, not required by the terms of the contract. If it is determined that the order is not due to Contractor's failing, such suspension, delay, or interruption shall be considered as ordered by the Architect/Engineer in the administration of the contract under the contract clause SUSPENSION OF WORK.

G. Payment

No separate payment will be made for work covered under this section; all costs associated with this section shall be included in the contract unit and/or lump sum prices in the Bidding Schedule.

1.2 LAND RESOURCES

The Contractor shall confine all activities to areas defined by the drawings and specifications. Prior to the beginning of any construction, the Contractor shall identify the land resources to be preserved within the work area. Except in areas indicated on the drawings or specified to be cleared, the Contractor shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without permission. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized. Where such emergency use is permitted, the Contractor shall provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs. Stone, earth or other material displaced into uncleared areas shall be removed.

A. Work Area Limits

Prior to any construction, the Contractor shall mark the areas that need not be disturbed under this contract. Isolated areas within the general work area which are to be saved and protected shall also be marked or fenced. Monuments and markers shall be protected before construction operations commence. Where construction operations are to be conducted during darkness, the markers shall be visible. The Contractor's personnel shall be knowledgeable of the purpose for marking and/or protecting particular objects.

B. Landscape

Trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved shall be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques.

C. Unprotected Erodible Soils

Earthwork brought to final grade shall be finished as indicated. Side slopes and back slopes shall be protected as soon as practicable upon completion of rough grading. All earthwork shall be planned and conducted to minimize the duration of exposure of unprotected soils.

D. Disturbed Areas

The Contractor shall effectively prevent erosion and control sedimentation through approved methods including, but not limited to, the following:

1. Retardation and control of runoff. Runoff from the construction site or from storms shall be controlled, retarded, and diverted to protected drainage courses by means of diversion ditches, benches, berms, and by any measures required by area wide plans under the Clean Water Act.

E. Contractor Facilities and Work Areas

The Contractor's field offices, staging areas, stockpile storage, and temporary buildings shall be placed in areas designated on the drawings or as directed by the Architect/Engineer. Temporary movement or relocation of Contractor facilities shall be made only when approved. Temporary excavation and embankments for plant and/or work areas shall be controlled to protect adjacent areas from despoilment.

1.3 WATER RESOURCES

The Contractor shall keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters. Toxic or hazardous chemicals shall not be applied to soil or vegetation when such application may cause contamination of the fresh water reserve.

1.4 AIR RESOURCES

Equipment operation and activities or processes performed by the Contractor in accomplishing the specified construction shall be in accordance with the State's rules and all Federal emission and performance laws and standards. Ambient Air Quality Standards set by the Environmental Protection Agency shall be maintained. Monitoring of air quality shall be the Contractor's responsibility.

A. Hydrocarbons and Carbon Monoxide

Hydrocarbons and carbon monoxide emissions from equipment shall be controlled to Federal and State allowable limits at all times.

B. Odors

Odors shall be controlled at all times for all construction activities, processing and preparation of materials.

C. Sound Intrusions

The Contractor shall keep construction activities under surveillance and control to minimize environment damage by noise.

1.5 WASTE DISPOSAL

Disposal of wastes shall be as specified in Section 02220: DEMOLITION and as specified below.

A. Solid Wastes

Solid wastes (excluding clearing debris) shall be placed in containers which are emptied on a regular schedule. Handling and disposal shall be conducted to prevent contamination. Segregation measures shall be employed so that no hazardous or toxic waste will become co-mingled with solid waste. The Contractor shall transport solid waste off City property and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal.

B. Chemical Wastes

Chemicals shall be dispensed ensuring no spillage to ground or water. Periodic inspections of dispensing areas to identify leakage and initiate corrective action shall be performed and documented. Chemical waste shall be collected in corrosion resistant, compatible containers. Wastes shall be disposed of in accordance with Federal and local laws and regulations.

C. Hazardous Wastes

The Contractor shall take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing and shall collect waste in suitable containers observing compatibility. The Contractor shall transport hazardous waste off City property and dispose of it in compliance with Federal and local laws and regulations. Spills of hazardous or toxic materials shall be immediately reported to the Architect/Engineer. Cleanup and cleanup costs due to spills shall be the Contractor's responsibility.

D. Burning

Burning will not be allowed on construction site.

1.6 HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

If during excavation or other construction activities any previously unidentified or unanticipated resources are discovered or found, all activities that may damage or alter such resources shall be temporarily suspended. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rocks or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, the Contractor shall immediately notify the Architect/Engineer.

1.7 POST CONSTRUCTION CLEANUP

The Contractor shall clean up all areas used for construction.

1.8 RESTORATION OF LANDSCAPE DAMAGE

The Contractor shall restore landscape features damaged or destroyed during construction operations outside the limits of the approved work areas.

1.9 MAINTENANCE OF POLLUTION FACILITIES

The Contractor shall maintain permanent and temporary pollution control facilities and devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

1.10 TRAINING OF CONTRACTOR PERSONNEL

The Contractor's personnel shall be trained in all phases of environmental protection. The training shall include methods of detecting and avoiding pollution, familiarization with pollution standards, both statutory and contractual, and installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental pollution control.

END OF SECTION

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SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 SCOPE

- A. Provide temporary utilities and miscellaneous facilities required during construction, complete, including maintenance and removal.

PART 2 - PRODUCTS

2.1 UTILITIES

- A. Temporary Utilities: Provide and pay for costs for gas, water, and electricity required for performance of this work. Make necessary arrangements with utility companies for temporary service.
 - 1. Gas and Water: Provide necessary temporary piping and fittings.
 - 2. Electricity: Provide necessary temporary electric wiring. Provide area distribution boxes so located that individual trades may use their own construction type extension cords to obtain adequate power and lighting for construction operations.
- B. Telephone: Provide telephone and facsimile machine in the field office. Pay costs for temporary service.

2.2 TEMPORARY SANITARY FACILITIES

- A. Provide on-site temporary toilet facilities for use of construction personnel; maintain in a sanitary condition. Comply with applicable codes and regulations of authorities having jurisdiction.

2.3 FIELD OFFICE AND SHEDS

- A. Provide field office and storage facilities adequate in size and accommodation for Contractor's offices, superintendent's office, and supply and tool's rooms. Make the field office available to Architect throughout entire construction period.

2.4 PROJECT IDENTIFICATION

- A. Provide project sign, to be located as directed by Architect. Exact text lettering, and paint color selection will be provided by Architect at a later date.
- B. Sign to be not less than 32 sq. ft., with painted graphic content to include title of project, name of Owner, name and title of authorities, name and title of Architect and Engineer, prime contractor, and major subcontractors.
- C. Sign Materials: New or used wood or metal structure and framing and exterior grade softwood plywood with medium density overlay for sign surface. Use standard large sizes to minimize joints.
- D. Paint exposed surfaces of supports, framing, and surface material with coat of primer

and one coat of exterior paint as specified in Section 09900.

- E. Remove sign, framing, and supports at completion of project.

2.5 PERSONNEL IDENTIFICATION

- A. Provide identification badges for all employees. Badges shall be minimum 2-1/2 inches in diameter, with Contractor's name in not less than 12 point capital letters and employee's identification number in not less than 24 point size. Provide letters and background in light and dark colors respectively (or dark and light) to facilitate easy reading.

2.6 CONSTRUCTION AIDS

- A. Provide and maintain for the duration of construction temporary equipment and apparatus including scaffolds, elevators and hoists, canopies, tarpaulins, barricades, warning signs, steps, ladders, platforms, ramps, chutes, and other temporary construction aids and miscellaneous facilities as necessary for proper completion of the work; comply with pertinent safety regulations.

2.7 TEMPORARY HEAT

- A. Provide temporary heat where indicated and where needed for the proper performance of work, for curing or drying of work recently installed, and protection of work in place from, adverse effects of low temperatures.

2.8 DEWATERING AND SNOW AND ICE REMOVAL

- A. Maintain site, excavations, and construction free of water, snow and ice, as necessary for protection and execution of the work. Comply with dewatering requirements specified in Section 02200; where feasible, utilize same facilities.

2.9 TEMPORARY FENCING

- A. Provide and maintain a temporary fence around the entire construction area, with truck and pedestrian gates, as required by project conditions. The General Contractor may, at his discretion, provide whatever type of fencing he determines suitable to fence around whatever construction materials, equipment, vehicles, etc. in storage at the site for his benefit and security. Fencing may be economical as well as durable for the length of time it will exist.

2.10 TEMPORARY FIRE PROTECTION

- A. During construction period and until fire protection needs are fulfilled by permanent facilities, provide and maintain types and forms of temporary fire protection needed to protect facilities against fire losses. Store combustible materials in recognized fire-safe locations and containers.

2.11 SECURITY

- A. Provide sufficient control to prevent illegal entry or damage during nights, holidays,

or other periods when work is not being executed, and such other controls as required during working hours.

PART 3 - EXECUTION

3.1 REMOVAL

- A. Maintain construction facilities and temporary controls as long as needed for safe and proper completion of work. Remove temporary facilities and controls as rapidly as progress of work will permit or as directed by Architect.

END OF SECTION

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SECTION 01526 - TRENCH SAFETY SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Publications referenced below define construction safety regarding trenching. The Code of Federal Regulations (CFR) publications:
 - 1. 29 CFR, Part 1910:m Occupational Safety and Health Administration (OSHA) General Industry and Health Standards.
 - 2. 29 CFR, Part 1926: OSHA Construction Industry Standards.
- B. Acquisition of Publications: Referenced CFR publications may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

1.2 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Section 02220
- B. Occupational Safety and Health Administration (OSHA) Technical Manual Section V, Chapter 2.

1.3 SAFETY MEETING

- A. Prior to commencing construction, the Contractor, including the principal on-site project representative and one or more safety representatives, shall meet with designated representatives of the Owner, for the purpose of reviewing the Contract's safety and health requirements.
- B. The Contractor's safety and health program shall be reviewed, and implementation of safety and health provisions pertinent to the Work shall be discussed.

1.4 COMPLIANCE WITH REGULATIONS

- A. The Work involving trench excavation which exceeds five (5) feet in depth shall comply with the OSHA Technical Manual referenced above and with the applicable requirements of 29 CFR 1926, Subpart P.
- B. Work shall additionally comply with applicable state and local safety and health regulations.
- C. In case of a conflict between applicable regulations, the more stringent requirements shall apply.
- D. Contractor Responsibility: The Contractor shall assume full responsibility and liability for compliance with all applicable codes, standards and regulations pertaining to the health and safety of personnel during execution of the Work, and shall hold the Owner harmless for any action on the Contractor's part, or that of the Contractor's employees or subcontractors, that results in illness, injury or death.
- E. The Contractor shall have written safety and health programs in compliance with 29 CFR 1926.

1.5 SUBMITTALS

- A. Safety and Health Programs: The Contractor shall submit, for approval, copies of the project safety and health programs, as applicable to the work scope, or required as a result of the safety meeting, including but not necessarily limited to the following:
 - 1. Fall Protection.
 - 2. Personnel Protective Equipment.
 - 3. Respirator Protection.
 - 4. Confined spaces.
- B. Contractor's Safety Plan: In addition to specific safety and health programs applicable to the project, Contractor shall submit firm's general safety plan listing emergency procedures and contact persons with home addresses and telephone numbers.
- C. Accident Reporting: Submit a copy of each accident report that the Contractor or Subcontractors submits to their insurance carriers, within seven calendar days after the date of the accident.

PART 2 - PRODUCTS

2.1 PERSONNEL PROTECTIVE EQUIPMENT

- A. Special facilities, devices, equipment and similar items used by the Contractor in execution of the Work shall comply with 29 CFR 1926 and other applicable regulations.

PART 3 - EXECUTION

3.1 EMERGENCY SUSPENSION OF WORK

- A. When the Contractor is notified by the Owner or the Architect, or the Owner's authorized representative, of non-compliance with the safety or health provisions of the Contract, the Contractor shall immediately, correct the unsafe or unhealthy condition.
- B. If the Contractor fails to comply promptly, all or part of the Work will be stopped by written notice from the Architect or his authorized representative.
- C. When, in the opinion of and by written notice given by the Architect or his authorized representative, satisfactory corrective action has been taken by the Contractor, work shall resume.
- D. The Contractor shall not be allowed any extension of time or compensation for damages in connection with a work stoppage for an unsafe or unhealthy condition.

3.2 PROTECTION OF PERSONNEL

- A. The Contract shall take all necessary precautions to prevent injury to the public, occupants, or damage to property of others. The public and occupants includes all persons not employed by the Contractor or a subcontractor.

- B. Wherever practical, the work area shall be fenced, barricaded or otherwise blocked off from the public or occupants to prevent unauthorized entry into the work area.
- C. Provide traffic barricades and traffic control signage where construction activities occur in vehicular areas.
- D. Corridors, aisles, stairways, doors and exitways shall not be obstructed or used in a manner to encroach upon routes of ingress or egress utilized by the public or occupants, or to present an unsafe or unhealthy condition to the public or occupants.
- E. Store, position and use equipment, tools, materials, scraps and trash in a manner that does not present a hazard to the public or occupants by accidental shifting, ignition or other hazardous activity.
- F. Store and transport refuse and debris in a manner to prevent unsafe and unhealthy conditions for the public and occupants. Cover refuse containers, and remove refuse on a frequent regular basis acceptable to the Architect and/or the Owner. Use tarpaulins or other means to prevent loose transported materials from dropping from trucks.

END OF SECTION

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SECTION 01630 - SUBSTITUTIONS

PART 1 - GENERAL

1.01 **GENERAL:** General Conditions of the Contract, Supplementary Conditions, pertinent portions of sections in Division 1 of the Project Specifications and the Drawings shall apply to the Work of this Section

1.02 **SUBSTITUTIONS:**

A. **Product List:** Within 30 days after Contract Date, submit to the Architect a complete list of major products proposed to be used, with name of manufacturer and installing contractor.

B. **Contractor's Option:**

1. For products or methods specified only by commercial standard, reference standard, Federal Specification, trade association standards or other similar standards; select any product or method meeting that standard. Where this specification requires a better quality than such standard, these project specifications shall govern.
2. For products specified by naming several products or manufacturers, select any one of products or manufacturers named, which complies with this project specification.
3. For products specified by naming one or more products, methods or manufacturers and "or equal", Contractor must submit a request as for substitutions for any product or method or manufacturer not specifically named.
4. For products specified by naming only one product, method or manufacturer, and "no substitutions"; provide specified product, methods or manufacturer.

NOTE: Where proprietary products or methods are specified for one use, the intention is to establish a standard of quality, performance and/or size and not to exclude any other products of equal merit unless stated otherwise.

1.03 **SUBSTITUTIONS:** For products specified as above, bids shall be based on products named in project manual, or on items which Architect has designated as an "approved equal". A product not named in project manual or that is not approved by Architect

will only be acceptable when such product meets all other requirements of project specifications, including specifications of originally specified products' manufacturer as of date of contract documents.

- 1.04 **REQUESTS FOR SUBSTITUTIONS:** Requests for Architects approval of a product as equal will not be considered unless sufficient data for evaluation is received by Architect.
- 1.05 **SUBMITTALS:** Submit a separate request for each product, supported with complete data, with drawings, cut sheets, and samples as appropriate, including:
- A. Comparison of qualities of proposed substitution with that of specified product.
 - B. Changes required in other elements of the Work because of substitution.
 - C. Effect on construction schedule.
 - D. Cost data comparing proposed substitution with product specified.
 - E. Availability of maintenance service, and source of replacement parts.
- 1.06 **CONTRACTOR'S REPRESENTATION:** Contractor's substitution of a product constitutes a representation that Contractor:
- A. Has investigated proposed product and determined that it is equal or superior in all respects to that specified.
 - B. Will provide same warranties or bonds for substitutions as for product specified.
 - C. Will coordinate installation of an accepted substitution into Work, and make such other changes as may be required to make Work complete in all respects.
 - D. Waives all claims for additional costs, under his responsibility, which may subsequently become apparent.
- 1.07 **APPROVAL:** Architect shall be judge of acceptability of proposed substitutions. Architect will review requests for substitutions with reasonable promptness, and notify Contractor, in writing, of decision to accept or reject requested substitution.
- 1.08 **NOTICE:** Architect's approval of an item for a previous project does not constitute approval for this Project.

Farmers Market
Paragould, Arkansas

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PART 2 - PRODUCTS NOT APPLICABLE

PART 3 - EXECUTION NOT APPLICABLE

END OF SECTION

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SECTION 01700 - CONTRACT CLOSEOUT

PART 1 - GENERAL

- 1.01 SCOPE: Comply with requirements state in Conditions of the Contract and in Specifications for administrative procedure in closing out the Work.
- 1.02 WORK SPECIFIED IN OTHER SECTION:
 - A. Cleaning: Section 01710
 - B. Project Record Documents: Section 01720
 - C. Operating and Maintenance Data: Section 01730
 - D. Warranties and Bonds: Section 01740
- 1.03 SUBSTANTIAL COMPLETION:
 - A. When Contractor considers the Work is substantially complete, he shall submit to Architect, written notice that the Work, or designated portion thereof, is substantially complete including list of items to be completed or corrected.
 - B. Within a reasonable time after receipt of such notice, Architect will make an inspection to determine the status of completion.
 - C. Should Architect determine that the Work is not substantially complete:
 - 1. Architect will promptly notify the Contractor in writing, giving the reasons therefore including list of items to be completed or corrected.
 - 2. Contractor shall remedy the deficiencies in the Work, and send a second written notice of substantial completion to the Architect.
 - 3. Architect will reinspect the Work.
 - D. When Architect concurs that the Work is substantially complete, he will:
 - 1. Prepare a Certificate of Substantial Completion on AIA Form G704, accompanied by Contractor's list of items to be completed or corrected, as verified and amended by the Architect.

2. Submit the Certificate to Owner and Contractor for their written acceptance of the responsibilities assigned to them in the Certificate.

1.04 FINAL INSPECTION:

- A. When Contractor considers the Work is complete, he shall submit written certification that:
 1. Contract Documents have been reviewed.
 2. Work has been inspected for compliance with Contract Documents.
 3. Work has been completed in accordance with Contract Documents.
 4. Equipment and systems have been tested in the presence of the Owner's representative and are operational.
 5. Work is completed and ready for final inspection.
- B. Architect will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.
- C. Should Architect consider that the Work is incomplete or defective:
 1. Architect will promptly notify the Contractor in writing, listing the incomplete or defective work.
 2. Contractor shall take immediate steps to remedy the stated deficiencies, and send a second written certification to Architect that the Work is complete.
 3. Architect will reinspect the Work.
- D. When the Architect finds that the Work is acceptable under the Contract documents, he shall request the Contractor to make closeout submittals.

1.05 REINSPECTION FEES:

- A. Should Architect perform reinspection due to failure of the Work to comply with the claims of status of completion made by the Contractor:

1. Owner will compensate Architect for such additional services.
2. Owner will deduct the amount of such compensation from the final payment to the Contractor.

1.06 CONTRACTOR'S CLOSEOUT SUBMITTALS:

- A. Evidence of compliance with requirements of governing authorities:
 1. Certificate of Occupancy.
 2. Certificates of Inspection:
 - a. Mechanical
 - b. Electrical
- B. Project Record Documents: To requirements of Section 01720.
- C. Operating and Maintenance Data, Instructions to Owner's Personnel: To requirements of Section 01730.
- D. Warranties and Bonds: To requirements of Section 01740.
- E. Keys and Keying Schedule: To requirements of Section 08710-Finish Hardware.
- F. Evidence of Payment and Release of Liens: To requirements of General and Supplementary Conditions.

1.07 FINAL ADJUSTMENTS OF ACCOUNTS:

- A. Submit a final statement of accounting to Architect. Statement shall reflect all adjustments to the Contract Sum:
 1. The original Contract Sum.
 2. Additions and deductions resulting from:
 - a. Previous Change Orders.
 - b. Allowances.

- c. Unit Prices
 - d. Deductions for uncorrected Work.
 - e. Deductions for reinspection payments.
 - f. Other adjustments.
 - 3. Total Contract Sum, as adjusted.
 - 4. Previous payments.
 - 5. Sum remaining due.
 - B. Architect will prepare a final Change Order, reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.
- 1.08 FINAL APPLICATION FOR PAYMENT:
- A. Contractor shall submit the final Application for Payment in accordance with procedures and requirements stated in the Conditions of the Contract.

END OF SECTION

SECTION 01710 - CLEANING

PART 1 - GENERAL

- 1.01 DESCRIPTION: Execute cleaning, during progress of the Work, and at completion of the Work, as required by General Conditions.
- 1.02 DISPOSAL REQUIREMENTS: Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

PART 2 - PRODUCTS

- 2.01 MATERIALS:
- A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
 - B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.
 - C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

- 3.01 DURING CONSTRUCTION:
- A. Contractor at all times shall keep the premises free from accumulation of waste materials or rubbish caused by his operations or his subcontractor's operations. Oversee cleaning and ensure that building and grounds are maintained free from accumulations of waste materials and rubbish.
 - B. At reasonable intervals during progress of work, clean up site, building and access, and dispose of waste materials, rubbish and debris. Provide containers and locate on site for collection of waste materials, rubbish and debris. Do not allow waste materials, rubbish and debris to accumulate and become an unsightly or hazardous condition.
 - C. Transport waste materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces. Sprinkle dusty debris with water.

- D. Burning or burying of rubbish and waste materials on the project site is not permitted. Disposal of volatile fluid wastes (such as mineral spirits, oil, or paint thinner) in storm or sanitary sewer systems is not permitted. Remove waste materials, rubbish and debris from the site and legally dispose of at public or private dumping areas off the Owner's property.

3.02 DUST CONTROL:

- A. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.
- B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.
- C. Broom clean interior building areas when ready to receive finish painting and continue cleaning on an as-needed basis until building is ready for acceptance or occupancy.

3.03 FINAL CLEANING:

- A. At completion of construction and just prior to acceptance or occupancy conduct a final inspection of exposed interior and exterior surfaces. Perform final cleaning and maintain cleaning until building, or portion thereof, is accepted by Owner.
- B. Remove grease, dust, dirt, stains, labels, fingerprints and other foreign materials from interior and exterior surfaces. Repair, patch and touch-up marred surfaces to match adjacent finishes. Broom clean paved surfaces; rake clean other surfaces of grounds.
- C. Clean all glass and all other finish surfaces, replace all broken and scratched glass; remove stains, spots, marks and dirt from decorated work; clean all hardware; remove paint spots and smears from all surfaces, clean all fixtures and wash or vacuum all floors; leaving work in a clean and spotless condition.
- D. Replace air conditioning filters if units were operated during construction. Clean ducts, blowers and coils if air conditioning units were operated without filters during construction.
- E. Remove all waste materials and rubbish from and about the Project as well as all tools, construction equipment, machinery and surplus cleaning.

- F. Use experienced workmen or professional cleaners for final cleaning.
- G. Comply with cleaning instructions contained in the Specifications. In absence of specific cleaning instructions, follow accepted cleaning practices or the recommendations of the manufacturer of the material to be cleaned.

END OF SECTION

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SECTION 01720 - PROJECT RECORD DOCUMENTS

1.01 GENERAL:

- A. Maintain at the Site for the Owner one record copy of:
 - 1. Drawings and Specifications
 - 2. Addenda
 - 3. Change Orders and other Modifications to the Contract
 - 4. Architect/Engineer Field Orders or written instructions.
 - 5. Approved Shop Drawings, Product Data and Samples.
 - 6. Field Test records.
- B. The Contractor will provide one set of Construction Drawings at the time construction is commenced. These drawings shall be marked-up by each Contractor, throughout the construction period, indicating all changes, revisions and additions to the work, including field relocations of work concealed from view.

1.02 RECORD DRAWINGS: In accordance with the requirements of the General Conditions, the Architect will provide the Contractor with a set of reproducible drawings of the original bidding documents, as required and at Contractor's expense as follows:

- A. If the Contractor elects to vary from the Contract Documents, and secures prior approval of the Architect, for any phase of the Work other than those listed below, he shall record in a neat readable manner all such variances on the reproducible drawings furnished.
- B. For plumbing, heating, ventilating and air conditioning, electrical, and fire protection Work Record Drawings shall be maintained by the Contractor as the Work progresses and as follows:
 - 1. All deviations from sizes, locations and from all other features of all installations shown in the Contract Documents shall be recorded.

2. In addition, it shall be possible, using these drawings, to correctly and easily locate, identify and establish sizes of all piping, directions and the like, as well as all other features of Work which will be concealed underground and/or in the finished building.
 - a. Locations of underground Work shall be established by dimensions to column lines or walls, locating all turns, etc., and by properly referenced centerline or invert elevations and rates of fall.
 - b. For Work concealed in the building, sufficient information shall be given so it can be located with reasonable accuracy and ease. In some cases, this may be sufficient to illustrate the Work on the drawings in relation to the spaces in the building near which it was actual installed. Architect's decisions shall be final.
- C. The following requirements apply to all Record Drawings:
 1. They shall be maintained at the Contractor's expense.
 2. All such drawings shall be done carefully and neatly by a competent draftsmen and in form approved by the Architect.
 3. Additional drawings shall be provided as necessary for clarification.
 4. They shall be kept up-to-date during the entire course of the Work and shall be available on request for examination by the Architect and, when necessary, to establish clearances for other parts of the work.
 5. The Record Drawings shall be returned to the Architect on completion of the Work and are subject to the approval of the Architect.

END OF SECTION

SECTION 01730 - OPERATING AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 GENERAL:

- A. Compile Manufacturer's Directions and Manuals, Product Data and related information appropriate for Owner's maintenance and operation of products furnished under the Contract.
 - 1. Furnish operating and maintenance data as specified in other pertinent sections of Specifications.
- B. Instruct Owner's personnel in the maintenance of products and in the operation of equipment and systems.

1.02 FORM OF SUBMITTALS:

- A. Prepare data in the form of an instructional manual for use by Owner's personnel.
- B. Bind in Commercial quality three ring binders with durable and cleanable plastic cover, with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS".
- C. When multiple binders are used, correlate the data into related consistent groupings.

1.03 CONTENT OF MANUAL:

- A. Neatly typewritten table of contents for each volume, arranged in a systematic order.
 - 1. Contractor, name of responsible principal, address and telephone number.
 - 2. A list of each product required to be included, indexed to the content of the volume.
 - 3. List, with each product, the name, address and telephone number of:
 - a. Subcontractor or installer.
 - b. Maintenance contractor, as appropriate.

- c. Identify the area of responsibility of each.
 - d. Source of supply for parts and replacement.
 - 4. Identify each product-by-product name and other identifying symbols.
 - B. Product Data: Include only those sheets which are pertinent to the specific product. Clearly identify the specific product or part installed.
 - C. Drawings: Supplement product data with drawings as necessary to clearly illustrate relations of component parts of equipment and systems, and control and flow diagrams.
 - 1. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.
 - 2. Do not use Project Record Documents as maintenance drawings.
 - D. Written text, as required to supplement product data for the particular installation:
 - 1. Organize in a consistent format under separate headings for different procedures.
 - 2. Instances which might affect the validity of warranties or bonds.
- 1.04 MANUAL FOR MATERIALS AND FINISHES:
- A. Submit two copies of complete manual in final form.
 - B. Content, for architectural products, applied materials and finishes:
 - 1. Manufacturer's data, giving full information on products.
 - 2. Instructions for care and maintenance.
- 1.05 MANUAL FOR EQUIPMENT AND SYSTEMS:
- A. Submit copies of complete manuals for mechanical and electrical equipment as required by Specifications.
- 1.06 SUBMITTAL SCHEDULE:

- A. Submit one copy of completed data in final form fifteen days prior to final inspection or acceptance.
 - 1. Copy will be returned after final inspection or acceptance, with comments.
- B. Submit specified number of copies of approved data in final form 10 days after final inspection or acceptance.

1.07 INSTRUCTION OF OWNER'S PERSONNEL:

- A. Prior to final inspection or acceptance, fully instruct Owner's designated operating and maintenance personnel in the operation, adjustment and maintenance of all products, equipment and systems.
- B. Operating and maintenance manual shall constitute the basis of instruction.
- C. Review contents of manual with personnel in full detail to explain all aspects of operations and maintenance.

END OF SECTION

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SECTION 01740 -WARRANTIES AND BONDS

1.01 SUBMITTAL REQUIREMENTS:

- A. Assemble warranties, bonds and services and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.
- B. Review submittals to verify compliance with Contract Documents. Submit to Architect for review and transmittal to Owner.

1.02 TIME OF SUBMITTALS:

- A. For equipment or component parts of equipment put into service during progress of construction submit within 10 days after inspection and acceptance.
- B. Otherwise make submittals within ten days after Date of Substantial Completion, prior to final request for payment.
- C. For items of work, where acceptance is delayed materially beyond the Date of Substantial Completion, provide updated submittal within ten days after acceptance, listing the date of acceptance as the start of the warranty period.

END OF SECTION

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SECTION 01750
Release of Lien Form

Contractor name: _____
Address: _____
Contract name/number: _____
Project location: _____
Contract execution date: _____

I, the undersigned, confirm that I was contracted to construct, alter or repair improvements on the above-referenced project.

All improvements on the subject properties have been fully and satisfactorily completed in substantial conformity with the contract. All materials used in said improvement, all labor performed thereon and all fees, industrial insurance and permits, in connection with the said improvements which might give rise to liens on the within described properties have been paid in full.

Listed below are all subcontractors and major material suppliers included in this work. Attached are waivers of liens from all of them as substantiation of the above statement.

Name of Subcontractor(s) or Supplier(s) and Addresses

The affiant hereby waives any lien or right to lien which he may have against the described property and warrants to save harmless the Owner from any liens which are now in existence, or may hereafter arise by reason of said improvements, and cause the same to be released of record immediately. The foregoing waiver and these statements are an express warranty and representation to the Owner of the facts whereof is acknowledged.

Date _____
Contractor

SUBSCRIBED and SWORN to before me on _____
Date

Notary Public

My commission expires: _____

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SECTION 01780

CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.1 SUBMITTALS

Two sets of the warranty management plan containing information relevant to the warranty of materials and equipment incorporated into the construction project, including the starting date of warranty of construction. The Contractor shall furnish with each warranty the name, address, and telephone number of each of the guarantor's representatives nearest to the project location. Engineer/Architect approval is required for submittals with a "A/E" designation; submittals having an "FIO" designation are for information only.

As-Built Drawings; A/E.

Drawings showing final as-built conditions of the project. The manually prepared drawings shall consist of 1 set approved marked working as-built prints.

Warranty Management Plan; A/E.

Two sets of the warranty management plan containing information relevant to the warranty of materials and equipment incorporated into the construction project, including the starting date of warranty of construction. The Contractor shall furnish with each warranty the name, address, and telephone number of each of the guarantor's representatives nearest to the project location.

1.2 PROJECT RECORD DOCUMENTS

A. As-Built Drawings

This paragraph covers as-built drawings complete, as a requirement of the contract. The terms "drawings," "contract drawings," "drawing files," "working as-built drawings" and "final as-built drawings" refer to contract drawings which are revised to be used for final as-built drawings.

1. Working As-Built and Final As-Built Drawings

The Contractor shall revise 1 set of paper drawings by red-line process to show the as-built conditions during the prosecution of the project. These working as-built marked drawings shall be kept current on a weekly basis and at least one set shall be available on the jobsite at all times. Changes from the contract plans which are made in the work or additional information which might be uncovered in the course of construction shall be accurately and neatly recorded as they occur by means of details and notes. The working as-built marked prints will be jointly reviewed for accuracy and completeness by the Engineer/Architect and the Contractor prior to submission of each monthly pay estimate. If the Contractor fails

to maintain the working drawings as specified herein, the Engineer/Architect will deduct from the monthly progress payment an amount representing the estimated cost of maintaining the as-built drawings. This monthly deduction will continue until an agreement can be reached between the Engineer/Architect and the Contractor regarding the accuracy and completeness of updated drawings. The working as-built drawings shall show, but shall not be limited to, the following information:

- a. The actual location, kinds and sizes of all sub-surface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, the as-built drawings shall show, by offset dimensions to two permanently fixed surface features, the end of each run including each change in direction. Valves, splice boxes and similar appurtenances shall be located by dimensioning along the utility run from a reference point. The average depth below the surface of each run shall also be recorded.
- b. The location and dimensions of any changes within the building structure.
- c. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.
- d. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.
- e. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.
- f. Changes or modifications which result from the final inspection.
 - 1) Where contract drawings or specifications present options, only the option selected for construction shall be shown on the final as-built prints.
 - 2) Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, and irrigation systems.
 - 3) Modifications (change order price shall include the Contractor's cost to change working and final as-built drawings to reflect modifications) and compliance with the following procedures.
 - 4) Directions in the modification for posting descriptive changes shall be followed.

- 5) A Modification Circle shall be placed at the location of each deletion.
 - 6) For new details or sections which are added to a drawing, a Modification Circle shall be placed by the detail or section title.
 - 7) For minor changes, a Modification Circle shall be placed by the area changed on the drawing (each location).
 - 8) For major changes to a drawing, a Modification Circle shall be placed by the title of the affected plan, section, or detail at each location.
 - 9) For changes to schedules or drawings, a Modification Circle shall be placed either by the schedule heading or by the change in the schedule.
- B. Drawing Preparation
These working as-built marked prints shall be neat, legible and accurate. These drawings are part of the permanent records of this project and shall be returned to the Engineer/Architect after approval by the District. Any drawings damaged or lost by the Contractor shall be satisfactorily replaced by the Contractor at no expense to the City of Cabot
- C. Manually Prepared Drawings
When final revisions have been completed, each drawing shall be lettered or stamped with the words "RECORD DRAWING AS-BUILT" followed by the name of the Contractor in letters at least 3/16 inch high.
- D. Payment
No separate payment will be made for as-built drawings required under this contract, and all costs accrued in connection with such drawings shall be considered a subsidiary obligation of the Contractor.

1.3 WARRANTY MANAGEMENT

The Contractor shall develop a warranty management plan which shall contain information relevant to the clause Warranty of Construction of the contract. The Contractor shall submit the warranty management plan for the City of Paragould's approval. The warranty management plan shall include all required actions and documents to assure that the City receives all warranties to which it is entitled. The plan shall be in narrative form and contain sufficient detail to render it suitable for use by future maintenance and repair personnel, whether tradesmen, or of engineering background, not necessarily familiar with this contract. Approved information shall be assembled in a binder and shall be turned over to the City upon acceptance of the work. The construction warranty period shall begin on the date of project acceptance and shall continue for the full product warranty period. Information contained in the warranty.

- A. Warranty Management Plan
1. Roles and responsibilities of all personnel associated with the warranty process, including points of contact and telephone numbers within the

organizations of the Contractors, subcontractors, manufacturers or suppliers involved.

2. Listing and status of delivery of all Certificates of Warranty for extended warranty items, to include roofs, HVAC balancing, pumps, motors, transformers, and for all commissioned systems such as fire protection and alarm systems, sprinkler systems, lightning protection systems, etc.
- 3.

1.4 OPERATION AND MAINTENANCE MANUALS

Operation manuals and maintenance manuals shall be submitted as specified. Operation manuals and maintenance manuals provided in a common volume shall be clearly differentiated and shall be separately indexed.

1.5 FINAL CLEANING

The premises shall be left broom clean. Stains, foreign substances, and temporary labels shall be removed from surfaces. Equipment and fixtures shall be cleaned to a sanitary condition. Filters of operating equipment shall be cleaned. Debris shall be removed from roofs, drainage systems, gutters, and downspouts. Paved areas shall be swept and landscaped areas shall be raked clean. The site shall have waste, surplus materials, and rubbish removed. The project area shall have temporary structures, barricades, project signs, and construction facilities removed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 02010

SUBSURFACE CONDITIONS

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 DESCRIPTION

- A. General
A soils investigation report has been prepared for the site of this work by Materials Testing of Arkansas, Inc., hereinafter referred to as the Soil Engineer.
- B. Availability
The soils investigation report is included in these specifications.
- C. Use of Data
 - 1. This report was obtained only for the Architect's/Engineer's use in design and is not a part of the Contract Documents. The report is available for bidder's information, but is not a warranty of subsurface conditions.
 - 2. Bidders should visit the site and acquaint themselves with all existing conditions. Prior to bidding, bidders may make their own subsurface investigations to satisfy themselves as to site and subsurface conditions, but all such investigations shall be performed only under time schedules and arrangements approved in advance by the Engineer/Architect.
 - 3. Bidders shall acquaint themselves with the soils investigation pertaining to the types of soil conditions found at this site.

1.3 QUALITY ASSURANCE

- A. Adjustment of Work
Readjust all work performed that does not meet technical or design requirements, but make no deviations from the Contract Documents without specific and written approval from the Architect/Engineer.

END OF SECTION 02010

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GEOTECHNICAL ENGINEERING EXPLORATION

**Farmers Market
Paragould, Arkansas**

PREPARED FOR:

ETC Engineers
1510 South Broadway
Little Rock, AR 72202

PREPARED BY:

MTA ENGINEERS

8001 National Drive
Little Rock, AR 72209

July 20, 2021

Husam Barakat
ETC Engineers
1510 South Broadway
Little Rock, AR 72202

July 20, 2021

Sent via email : samb@etcengineersinc.com

Subject: Report of Geotechnical Engineering Exploration
Proposed Farmers Market
Paragould, Arkansas

Mr. Barakat:

MTA Engineers has completed the authorized Geotechnical Engineering Exploration for the subject project. This work was conducted in accordance with the agreement between MTA Engineers and ETC Engineers which is detailed in MTA Engineers Proposal dated May 24, 2021.

The purpose of our work was to review general surface and subsurface conditions within the project site area, and to gather and present data relative to the design and construction of the proposed market located in Paragould, Arkansas. This report outlines the exploration procedures used, exhibits the data obtained, and presents our recommendations.

MTA Engineers appreciates this opportunity to provide these services and looks forward to working with you on future projects. Please contact us if you have any questions or require additional information.

Sincerely,

MTA ENGINEERS

Kelton Price, PE
Project Engineer
Office +1 501-753-2526
keltonp@mtaengineers.com

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EXECUTIVE SUMMARY

The geotechnical exploration was conducted on a property located on East Court Street and Chestnut Street in Paragould, Arkansas. In general, the soils will consist of medium dense fill near surface and clay soils at depth. Subsurface conditions were uniform throughout the entirety of the proposed development. There is a high probability of buried concrete, asphalt, boulders, and random debris.

Major soil types encountered at each boring may be summarized as follow:

Table 1. Soil Types Encountered

SOIL TYPE	DESCRIPTION
FILL	Sand-Clay-Fine Gravels Mixtures
CL	Lean Clay/ Silty Clay / Sandy Clay

See Table 2 General Strata Classification of Boring Logs or the individual boring logs found in Appendix B for a more detailed overview of the soils encountered on site.

It is anticipated that the proposed addition will be at/or above existing grades. The silty clay soils are moisture sensitive and contain organics, stability of these soils will depend on soil-moisture conditions at the time of construction. **The lot must be stripped of all organic containing soils in the order of 4 to 6-in.**

The soils of Stratum II are very soft in the primary grades. The area of the market should be raised a minimum of **3-ft** to allow for proper drainage and allow footings to bear on or above compacted select fill. If the area cannot be raised, depending upon time of construction, over-excavation of the soft layers should be expected in areas where loss of soil shear strength has occurred due to inundation.

Based on the anticipated loading, it is recommended that the market pad be supported on shallow footings be founded a minimum of **24-in** below final grade, within the properly compacted Structural fill. Footings founded as recommended may be designed using a net allowable bearing capacity of **3,000-psf** for continuous and/or individual spread footings.

The net allowable end bearing pressure is based on a factor of safety in excess of **3.0** with respect to the anticipated shear strength of the bearing stratum. Total and differential settlement is anticipated to be less than **½ -in.**

SUMMARY

- **Rock/Hard Dig:**
 - No hard dig material was encountered during our exploration.
 - The use of mini excavators will be limited with depth.
 - Concrete, tile, and cinder blocks were present on the property.
- **Soils:**
 - Stripping in the order of **4 to 6-in** is anticipated in the limited area of vegetation.
 - Soils will generally consist of medium dense fill and incredibly soft to stiff clayey soils.
 - Additional undercutting of soft layers may be required during wet periods of the year.
 - Backfill should consist of soils having a minimum P.I of 12%.
- **Foundations/Slabs:**
 - Shallow footings founded within Structural Fill may be sized using a bearing capacity of **3,000-psf** for individual and/or continuous spread footings.
- **Un-compacted Fill:**
 - No un-compacted fill was encountered on the property during the exploration.
- **Stump/Organic Findings:**
 - The potential to find stumps or other organic material beneath the surface is low.
- **Pavement:**
 - Pavement should meet minimum city requirements.
 - Recommendations for pavement sections are presented within this report.
- **Miscellaneous:**
 - There are no known existing utilities (outside of easement) on the property.

INTRODUCTION

This exploration was requested in order to evaluate existing subsurface conditions and provide geotechnical design recommendations. The results of this exploration and the geotechnical design recommendations for site construction are presented in this report.

Exploration was accomplished by:

1. Boring **6** locations up to **20-ft**, to explore subsurface soil, and groundwater conditions.
2. Obtaining samples from each stratum, within the accessible areas, using standard geotechnical sampling technique or standard penetration test.
3. Performing laboratory tests on various samples to determine pertinent engineering properties of the subsurface strata.
4. Analyzing field and laboratory test data to develop design recommendations.

The scope of this geotechnical exploration did not include an environmental assessment to determine the presence of wetlands and/ or hazardous or toxic materials in the soil or groundwater on or near this site. If there is concern of wetlands or a hazardous/ toxic material presence, a qualified environmental assessment consultant should be contacted to perform a site investigation before construction begins.

FIELD EXPLORATION

Subsurface conditions at the site were explored by using dry auger methods up to **20-ft** at **6** boring locations. The approximate boring locations are shown on the Plan of Excavation, Appendix A. Boring logs presenting descriptions of the soil strata encountered are included in Appendix B.

Samples were obtained throughout the entirety of most locations in general accordance with Standard Penetration Sampling (SPT). The recorded N-Values (Blows per foot) are indicated on the Boring Logs in the Blows per foot column. All soil samples encountered were removed from the field in moisture tight containers and transported to our laboratory for further examination.

At the lab, a visual classification was performed for each sample. All various soil types were then analyzed for specific engineering properties. The dry auger drilling procedures facilitated observation of shallow groundwater conditions. Groundwater was encountered in most boring locations within **6** to **8-ft** beneath existing grades.

GENERAL SITE AND SUBSURFACE CONDITIONS

The exploration for the proposed Farmers Market was conducted on a property located on East Court Street and Chestnut Street in Paragould, Arkansas. In the area covered with grass, the organic containing soils should be stripped in the order of **4 to 6-in.** The potential to find buried stumps beneath the surface is low.

The stratigraphy encountered in the boring locations is summarized in Table 2. Subsurface conditions were consistent throughout the entirety of the proposed development. Borings were advanced to a depth of up to **20-ft** BGS within the area of improvement using dry auger methods. For a more detailed description of soils encountered while testing see the boring log sheets found in attached preliminary report.

Table2. General Strata Classification of Boring Logs

STRATA	DEPTH (ft)	SOIL CLASSIFICATION	SOIL DESCRIPTION	SIGNIFICANT PROPERTIES
STRATUM I	0 - 2 to 2 - 4	FILL	Fill (sand-clay-gravel mixtures)	Medium Dense to Dense
STRATUM II (a)	2 - 6 to 4 - Completion	CL (Except in B-1)	Sandy Clay, Lean Clay, Silty Clay	Very Soft to Stiff Low Shrink Swell Potential
STRATUM II (b)	0 - 2 to 2 - Completion	CL-ML (In B-1 only)	Silty Clay	Very Soft to Stiff Moisture Sensitive
STRATUM II (c)	2 to 6	SC (In B-3 only)	Clayey Sands	Very Loose
STRATUM III	4 to Completion	ML (In B-7 only)	Sandy Silts	Firm to Stiff

During our exploration, groundwater was encountered within **6 to 8-ft** BGS. The potential exists for increased groundwater to develop during wetter seasons. The significant properties and characteristics of the subsurface strata pertinent to design and constructions are:

- A. The topography of the site and planned improvement location.
- B. The anticipated moderate loading.
- C. The presence of soft clayey soils in the primary grades
- D. The anticipated fill or excavation required to achieve bearing.

LABORATORY TESTING

Description of the soils encountered in the borings was prepared in general accordance with applicable ASTM standards. The soil stratification shown on the boring logs represents soil conditions at the specific boring locations. There may be some variations that occur between or beyond the boring locations.

The stratification lines on the boring logs represent the approximate boundaries between soil types, but the actual transitions between soil layers in the subsurface of the proposed site may be gradual. Laboratory testing was performed to verify/evaluate classification, volumetric stability, and to determine water content. The results of all testing performed are represented in Appendix D Laboratory Test Summary.

ANALYSIS AND RECOMMENDATIONS

SITE PREPARATION

Prior to the construction of any improvement or the placement of any fill, it is recommended that the site be stripped (grubbed) **4 to 6-in** in the limited area of vegetation. At the time of this exploration, the soils in the primary grades were found to be unstable. Due to the presence of soft near surface soils, if improvements are to be constructed at/or near current grades, over-excavation of soft saturated soils up to **7-ft** may be required. Evaluation at the time of construction will determine specific over-excavation depths.

Alternatively, to avoid over-excavation of soft soils, final grade should be raised a minimum of **3-ft** to allow for proper drainage and for footings to bear on/or above the properly compacted structural fill. As much of the existing concrete slab/pavement should be left in place as possible, and the concrete should be perforated to allow for vertical pressure transmission. Removal of any pavement/slab or compacted fill may result in over-excavation to achieve proper stability.

Excavation should be performed under dry conditions, using equipment adequate to perform the work. Depending upon the weather conditions, isolated undercuts of saturated soft clay may be necessary. Structural fill, where needed, should be placed as recommended in the "Structural Fill" section of the report. Positive drainage should be maintained throughout this process. The addition of excessive moisture could cause a significant loss of soil stability.

Groundwater was encountered during our exploration within **6 to 8-ft** BGS. There is also a potential for increased groundwater to develop during the wetter periods of the year. Consideration should be given to the incorporation of frequent French drains for the control of groundwater during wetter periods. Positive drainage should be maintained throughout the process.

STRUCTURAL FILL

Select fill, if required, should consist of approved materials, which are free of organic matter and debris. For approval, samples of the proposed fill material should be submitted to MTA Engineers for classification testing. Select fill consisting of low plasticity (minimum P.I of **12%**) soil such as lean clay or clayey gravel classifying as SC, CL, or GC according to the Unified Soils Classification System are generally considered suitable. Shale is considered suitable for structural fill.

High plasticity clay soils (soils with a Liquid Limit above **50**) should not be used as fill. In the roadway areas, a maximum rock fragment of 6-in may be used in depths greater than 4-ft of the engineered fill. The upper 4-ft of the parking and drive areas should follow the 4-in or smaller rock size fragments.

Placement of approved fill should be achieved in multiple thin lifts. Each lift should not exceed eight **8-in** in loose thickness. Compaction of these lifts should be performed with suitable equipment to achieve **95%** of modified proctor (ASTM D-1557) at $\pm 3\%$ of optimum moisture content. Care should be taken that all compaction recommendations are performed.

If cohesive soils are to be used, compaction should be performed using a kneading-type vibratory compactor, such as a vibratory sheepsfoot. The material should be broken down sufficiently to provide a dense matrix of particles.

BUILDING FOUNDATIONS

All foundations must satisfy two basic and independent design criteria. First, foundations must have acceptable factor of safety against bearing failure under maximum design loads. Secondly, movement of the foundation due to consolidation, shrinkage, and/or swelling of the supporting strata should not exceed tolerable limits for the structure.

Construction factors such as installation of foundations units, excavation procedures, and surface and groundwater conditions should also be considered. The factors and the aforementioned subsurface conditions were influential in development of the following recommendation.

In view of the anticipated foundation loading and subsurface conditions encountered, it is recommended that the proposed structures be supported on a foundation system designed in accordance with the following recommendations.

FOUNDATIONS/ SLABS

Shallow Foundations

It is recommended that the proposed improvement be supported on traditional shallow footings founded a minimum of **24-in** below final grade, within the properly compacted Structural fill. In addition, to minimize the potential for localized shear failure within the soils, a minimum footing width of **24-in** is recommended.

Traditional shallow footings founded as accounted may be designed using a net allowable end bearing pressures of **3,000-psf** for continuous and/or individual spread footings. The net allowable end bearing pressure is based on a factor of safety in excess of **3.0** with respect to the anticipated shear strength of the bearing stratum. Total and differential settlement is anticipated to be less than **1/2 -in.**

Slab-on-grade type construction is considered appropriate for the floor slab. We recommend that the slab be supported on **4-in** of clean crushed stone or gravel (ASTM C-33 #57 or equivalent) on prepared subgrade. A Class **A** impervious moisture barrier with a minimum thickness of **10-mils**, specified according to ASTM E-1745, should be provided between slab and the granular fill due to the potential for perched water to develop during the wetter seasons.

PAVEMENT DESIGN

Paved parking and drives will be constructed as part of the project. Design traffic volumes and loadings have not been determined. However, we anticipate that the paved drives will be subject to light vehicles and weekly service and delivery trucks. We anticipate that the drives will be placed at/or above the existing elevation. The site should be stripped off in the order of **4 to 6-in** where necessary.

The surface soils are moisture sensitive and are covered with grass in some areas. Areas of proposed pavement should be prepared in accordance with the "Site Preparation" of this report. The following design criteria were used to develop the recommended pavement sections in conjunction with the AASHTO Design Guide 1996:

Table 3. Pavement Design Assumption Values

PAVEMENT DESIGN ASSUMPTION VALUES	
CBR	5
R-VALUE	15
SOIL SUPPORT VALUE	5

Based on information obtained during this study, subgrade soils in the paved areas should generally consist of recompacted soils on Stratum II or Structural Fill. Structural fill, where required, should be placed as recommended in the site grading section of the report. It is recommended that positive site drainage should be provided during construction and be incorporated during the final design.

Table 4. Pavement Design Recommendations

PAVEMENT DESIGN RECOMMENDATIONS	
Standard Duty Asphalt Paving	2-in ACHM Surface Course
	8-in Crushed Stone Base Course
	12-in Compacted Subgrade
Heavy Duty Asphalt Paving	3-in ACHM Surface Course
	8-in Crushed Stone Base Course
	12-in Compacted Subgrade
Standard Duty Concrete Paving	5-in concrete pavement
	6-in Crushed Stone Base Course
	12-in Compacted Subgrade
Heavy Duty Concrete Paving & Dumpster Pad	6-in Concrete Pavement
	6-in Crushed Stone Base Course
	12-in Compacted Subgrade

Note: All pavement sections must comply with the city minimum requirements. It should be recognized that some periodic maintenance of pavement will be required. As a minimum, this should include periodic sealing of all joints and cracks to prevent surface water infiltration.

UN-COMPACTED FILL

No uncompacted fill was encountered on the property during our exploration.

STUMP/ ORGANIC FINDINGS

The potential to find organic material below the surface is very low.

SEISMIC CONSIDERATION

Based on IBC-2015, a site soil **Class C** may be used for design purpose. Liquefaction potential of the soils in Stratum I, II & III is negligible. Additional design information on Seismic Consideration is attached as Appendix E.

CONSTRUCTION PROCEDURES

The potential exists for increased groundwater to develop during wetter seasons. Therefore, foundations excavation and any other site grading should be performed during drier periods to reduce the possibility of changes in conditions.

Subsurface conditions significantly at variance with those encountered within the borings should be brought to the attention of the engineer, and work delayed pending evaluation and/or preparation of additional recommendations, if warranted.

◆ ◆ ◆ ◆

The following illustrations are attached and complete this report:

Appendix A: Plan of Excavation
Appendix B: Borings Logs
Appendix C: Key to terms and Symbols
Appendix D: Laboratory Test Results
Appendix E: Seismic Design Criteria

◆ ◆ ◆ ◆

Appendix A: Boring Location Plan



Appendix B: Boring Logs



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Boring Log Report

BORING NO. **B-1**

PAGE **1** OF **1**

JOB NO. _____

JOB NAME: **PROPOSED FARMERS MARKET**

COORDINATES: NORTH: _____ EAST: _____

STATION: _____

LOCATION: **PARAGOULD, AR**

DATE: **7-12-2021**

TYPE OF DRILLING: **DRY AUGER**

EQUIPMENT: **GEOPROBE 7822DT**

LOGGED BY: **S.MANZI**

DRILLED BY: **L.JOHNSON**

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	PLASTICITY INDEX	PERCENT PASSING #200	NO. OF BLOWS PER 6-IN.	N-Value
			SURFACE ELEVATION: EXISTING GRADES								
			RED, FILL (SAND-CLAY-GRAVEL MIX), DENSE	FILL						3 10-30	40
			SOFT		23	27.8	31	8	96.6	2 2-2	4
5			FIRM							3 2-4	6
			WET, STIFF							4 5-9	14
10			FIRM							3 4-5	9
				CL- ML							
15			FIRM							3 4-6	10
20			VERY STIFF							6 9-11	20
			Boring Terminated								
25											
30											

COMPLETION DEPTH: **20**

WATER DEPTH> INITIAL: **6**

AFTER 24 HOURS: **6**

REMARKS:



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Boring Log Report

BORING NO. **B-2**

PAGE **1** OF **1**

JOB NO. _____

JOB NAME: **PROPOSED FARMERS MARKET**

COORDINATES: NORTH: _____ EAST: _____

STATION: _____

LOCATION: **PARAGOULD, AR**

DATE: **7-12-2021**

TYPE OF DRILLING: **DRY AUGER**

EQUIPMENT: **GEOPROBE 7822DT**

LOGGED BY: **S.MANZI**

DRILLED BY: **L.JOHNSON**

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	PLASTICITY INDEX	PERCENT PASSING #200	NO. OF BLOWS PER 6-IN.	N-Value
			SURFACE ELEVATION: EXISTING GRADES								
			2" ACHM & 22" CONCRETE, TILE, CINDER BLOCKS								
			FILL W/ GRAVEL (RIVER ROCK, STIFF	FILL						1 13-9	22
5			SOFT							1 2-4	6
			WET, SOFT		21	28.0	37	16	96.4	3 2-3	5
10			FIRM							4 5-5	10
			BROWN-GRAY-TRACE RED, CLAY	CL							
15			STIFF							3 9-5	14
20			STIFF							6 8-11	19
			Boring Terminated								
25											
30											

COMPLETION DEPTH: **20**

WATER DEPTH> INITIAL: **6.5**

AFTER 24 HOURS: **6.5**

REMARKS:



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Boring Log Report

BORING NO. **B-3**

PAGE **1** OF **1**

JOB NO. _____

JOB NAME: **PROPOSED FARMERS MARKET**

COORDINATES: NORTH: _____ EAST: _____

STATION: _____

LOCATION: **PARAGOULD, AR**

DATE: **7-12-2021**

TYPE OF DRILLING: **DRY AUGER**

EQUIPMENT: **GEOPROBE 7822DT**

LOGGED BY: **S.MANZI**

DRILLED BY: **L.JOHNSON**

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	PLASTICITY INDEX	PERCENT PASSING #200	NO. OF BLOWS PER 6-IN.	N-Value
			SURFACE ELEVATION: EXISTING GRADES								
			FILL W/ GRAVEL (RIVER ROCK), MEDIUM DENSE	FILL						7 10-6	16
			VERY LOOSE		22	10.5	36	14	26.0	4 2-1	3
			BLACK-BROWN, CLAYEY SANDS W/ FINE GRAVELS	SC						WOH	2
5			VERY LOOSE							1-1	
			FIRM							1 4-3	7
			WET, FIRM							3 3-5	8
10											
			GRAY-BROWN-TRACE RED, CLAY W/ IRON NODULES	CL							
			FIRM							3 4-7	11
15											
			FIRM							3 6-4	10
20											
			Boring Terminated								
25											
30											

COMPLETION DEPTH: **20**

WATER DEPTH> INITIAL: **8**

AFTER 24 HOURS: **8**

REMARKS:



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Boring Log Report

BORING NO. **B-4**

PAGE **1** OF **1**

JOB NO. _____

JOB NAME: **PROPOSED FARMERS MARKET**

COORDINATES: NORTH: _____ EAST: _____

STATION: _____

LOCATION: **PARAGOULD, AR**

DATE: **7-12-2021**

TYPE OF DRILLING: **DRY AUGER**

EQUIPMENT: **GEOPROBE 7822DT**

LOGGED BY: **S.MANZI**

DRILLED BY: **L.JOHNSON**

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	PLASTICITY INDEX	PERCENT PASSING #200	NO. OF BLOWS PER 6-IN.	N-Value
			SURFACE ELEVATION: EXISTING GRADES								
			2" ACHM & 12" CONCRETE								
			BLACK-BROWN, CLAYEY SANDS W/ FINE GRAVELS, MEDIUM DENSE (FILL)	FILL						5 8-4	12
5			GRAY-TRACE RED, SILTY CLAY, SOFT		22	26.3	30	8	95.0	3 2-3	5
			FIRM, WET @ 6.5'							3 4-5	9
			FIRM GRAY-RED, CLAY	CL						2 4-6	10
10			FIRM							4 5-5	10
			Boring Terminated								
15											
20											
25											
30											

COMPLETION DEPTH: **11**

WATER DEPTH> INITIAL: **6.5**

AFTER 24 HOURS: **6.5**

REMARKS:



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Boring Log Report

BORING NO. **B-6**

PAGE **1** OF **1**

JOB NO. _____

JOB NAME: **PROPOSED FARMERS MARKET**

COORDINATES: NORTH: _____ EAST: _____

STATION: _____

LOCATION: **PARAGOULD, AR**

DATE: **7-12-2021**

TYPE OF DRILLING: **DRY AUGER**

EQUIPMENT: **GEOPROBE 7822DT**

LOGGED BY: **S.MANZI**

DRILLED BY: **L.JOHNSON**

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	PLASTICITY INDEX	PERCENT PASSING #200	NO. OF BLOWS PER 6-IN.	N-Value
			SURFACE ELEVATION: EXISTING GRADES								
			BROWN-BLACK, FILL (CLAYEY SAND W/ FINE GRAVELS), DENSE	FILL						6 11-29	40
			GRAY-TRACE RED, SILTY CLAY, VERY SOFT							1 1-2	3
5			FIRM		19	26.8	46	27	96.3	2 2-4	6
			FIRM GRAY-RED, CLAY	CL						5 5-3	8
10			FIRM							3 4-4	8
			Boring Terminated								
15											
20											
25											
30											

COMPLETION DEPTH: **10**

WATER DEPTH> INITIAL:

AFTER 24 HOURS:

REMARKS:



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Boring Log Report

BORING NO. **B-7**

PAGE **1** OF **1**

JOB NO. _____

JOB NAME: **PROPOSED FARMERS MARKET**

COORDINATES: NORTH: _____ EAST: _____

STATION: _____

LOCATION: **PARAGOULD, AR**

DATE: **7-12-2021**

TYPE OF DRILLING: **DRY AUGER**

EQUIPMENT: **GEOPROBE 7822DT**

LOGGED BY: **S.MANZI**

DRILLED BY: **L.JOHNSON**

DEPTH FT.	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	SOIL GROUP	PLASTIC LIMIT	% MOIST.	LIQUID LIMIT	PLASTICITY INDEX	PERCENT PASSING #200	NO. OF BLOWS PER 6-IN.	N-Value
			SURFACE ELEVATION: EXISTING GRADES								
			BROWN, SILTY CLAY, FIRM	CL- ML						2 2-4	6
			GRAY-RED, SANDY CLAY, FIRM	CL	19	25.0	40	21	52.2	3 3-4	7
5			FIRM							4 4-6	10
			STIFF BROWN-RED-TRACE GRAY, SANDY SILT	ML						5 9-7	16
10			FIRM							3 3-7	10
			Boring Terminated								
15											
20											
25											
30											

COMPLETION DEPTH: **10**

WATER DEPTH> INITIAL:

AFTER 24 HOURS:

REMARKS:

Appendix C: Key to Terms

TERMS AND SYMBOLS USED ON BORING LOGS

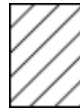
SOIL TYPES



CLAY (CH)



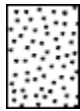
SILTY CLAY (CL)



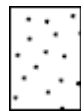
CLAY (CL)



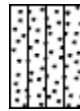
SANDY CLAY (CL)



WELL-GRADED SAND (SW)



POORLY-GRADED SAND (SP)



SILTY SAND (SM)



CLAYEY SAND (SC)



WELL-GRADED GRAVEL (GW)



POORLY-GRADED GRAVEL (GP)



SILTY GRAVEL (GM)



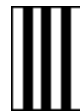
SANDY SILT (ML)



CLAYEY GRAVEL (GC)



SILT (ML)

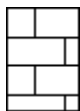


SILT (MH)

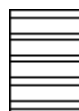


FILL MATERIAL

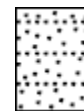
ROCK TYPES



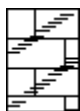
LIMESTONE



SHALE



SANDSTONE



WEATHERED LIMESTONE



WEATHERED SHALE



WEATHERED SANDSTONE

SAMPLER TYPE



SHELBY TUBE SAMPLE



SPLIT SPOON SAMPLE



AUGER SAMPLE



NO RECOVERY

SOIL GRAIN SIZE

U.S. STANDARD SIEVE								
12"	3"	3/4"	4	10	40	200		
BOULDERS	COBBLES	GRAVEL		SAND			SILT	CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE		
304	76.2	19.1	4.75	2	0.42	0.074	0.002	
SOIL GRAIN SIZE IN MILLIMETERS								

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (major portion retained on No 200 sieve): Includes (1) clean gravels and sands, and (2) silty clayey gravels and sands condition is rated according to relative density, as determined by laboratory tests.

DESCRIPTIVE TERMS	N VALUE	RELATIVE DENSITY
VERY LOOSE	0-4	0 – 15 %
LOOSE	4-10	15 – 35 %
MEDIUM DENSE	10-30	35 – 65 %
DENSE	30-50	65 – 85 %
VERY DENSE	50 and above	85 – 100 %

FINE GRAINED SOILS (major portion passing No 200 sieve): include (1) inorganic and organic silt and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer reading or by unconfined compression tests.

DESCRIPTIVE TERMS	N VALUE	UNCONFINED COMPRESSIVE STRENGTH
		TON / SQ. FT.
VERY SOFT	0-3	less than 0.25
SOFT	3-6	0.25 - 0.50
FIRM	6-12	0.50 - 1.00
STIFF	13-20	1.00 - 2.00
VERY STIFF	20-50	2.00- 4.00
HARD	50 and above	4.00 and higher

NOTE: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above because of planes of weakness or cracks in the soil. The consistency rating of such soils are based on penetrometer readings

TERMS CHARACTERIZING MOISTURE CONTENT

DRY: No water evident in sample; fines less than plastic limit.

MOIST: Sample feels damp; fines near the plastic limit.

VERY MOIST: Water visible on sample; fines greater than plastic limit and less than liquid limit.

WET: Sample bears free water; fines greater than liquid limit.

TERMS CHARACTERIZING SOIL STRUCTURE

SLICKENSIDED: Having inclined planes of weakness that are slick and glassy in appearance.

FISSURED: Containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.

LAMINATED: Composed of thin layer of varying color and texture.

INTERBEDDED: Composed of alternate layers of different soil types

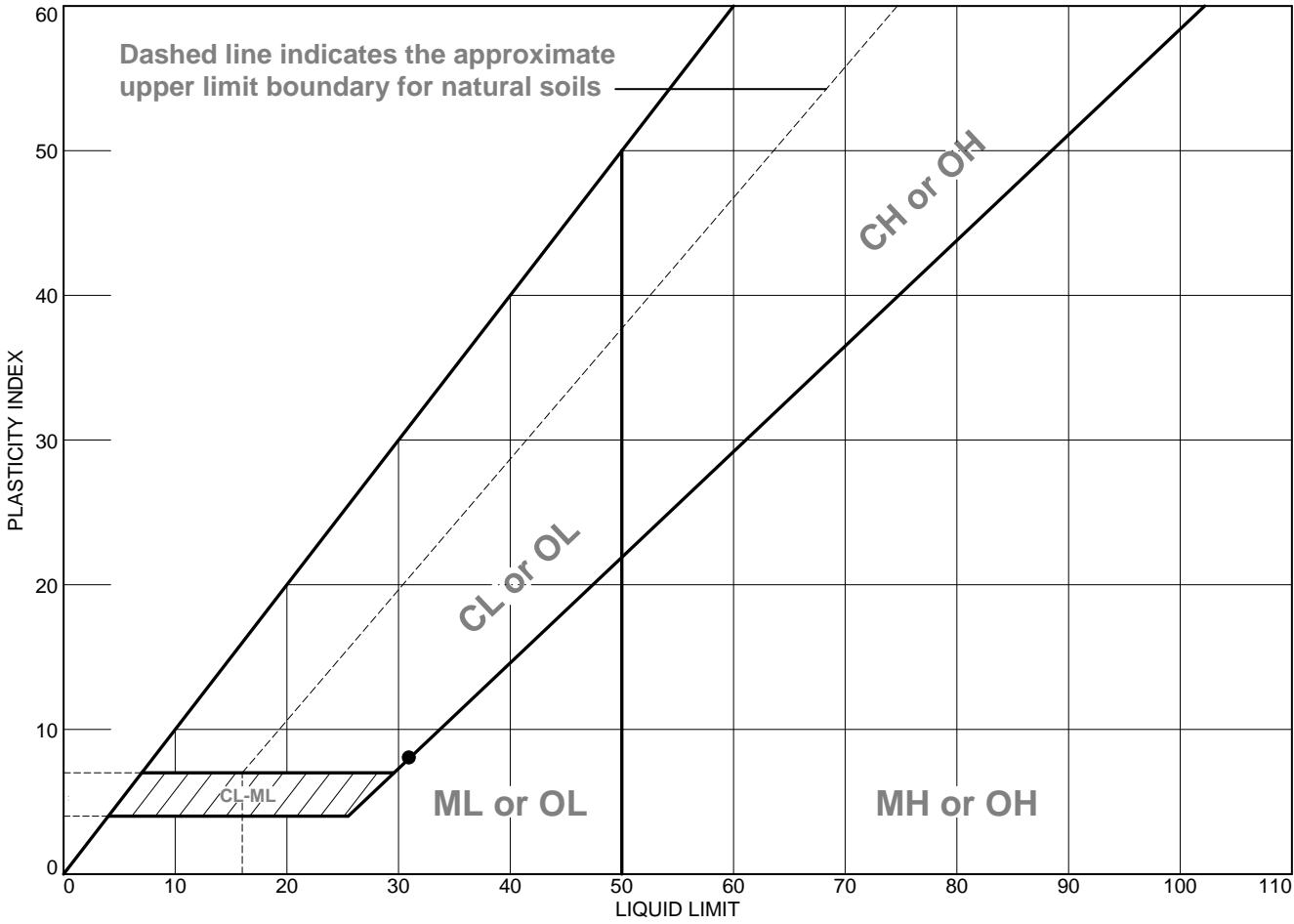
CALCAREOUS: Containing appreciable quantities of calcium carbonate.

WELL GRADED: Having wide range in grain sizes and substantial amounts of all intermediate particle size.

POORLY GRADED: Predominantly of one grain size, or having a range of sizes with some intermediate size missing

Appendix D: Laboratory Test Summary

LIQUID AND PLASTIC LIMITS TEST REPORT



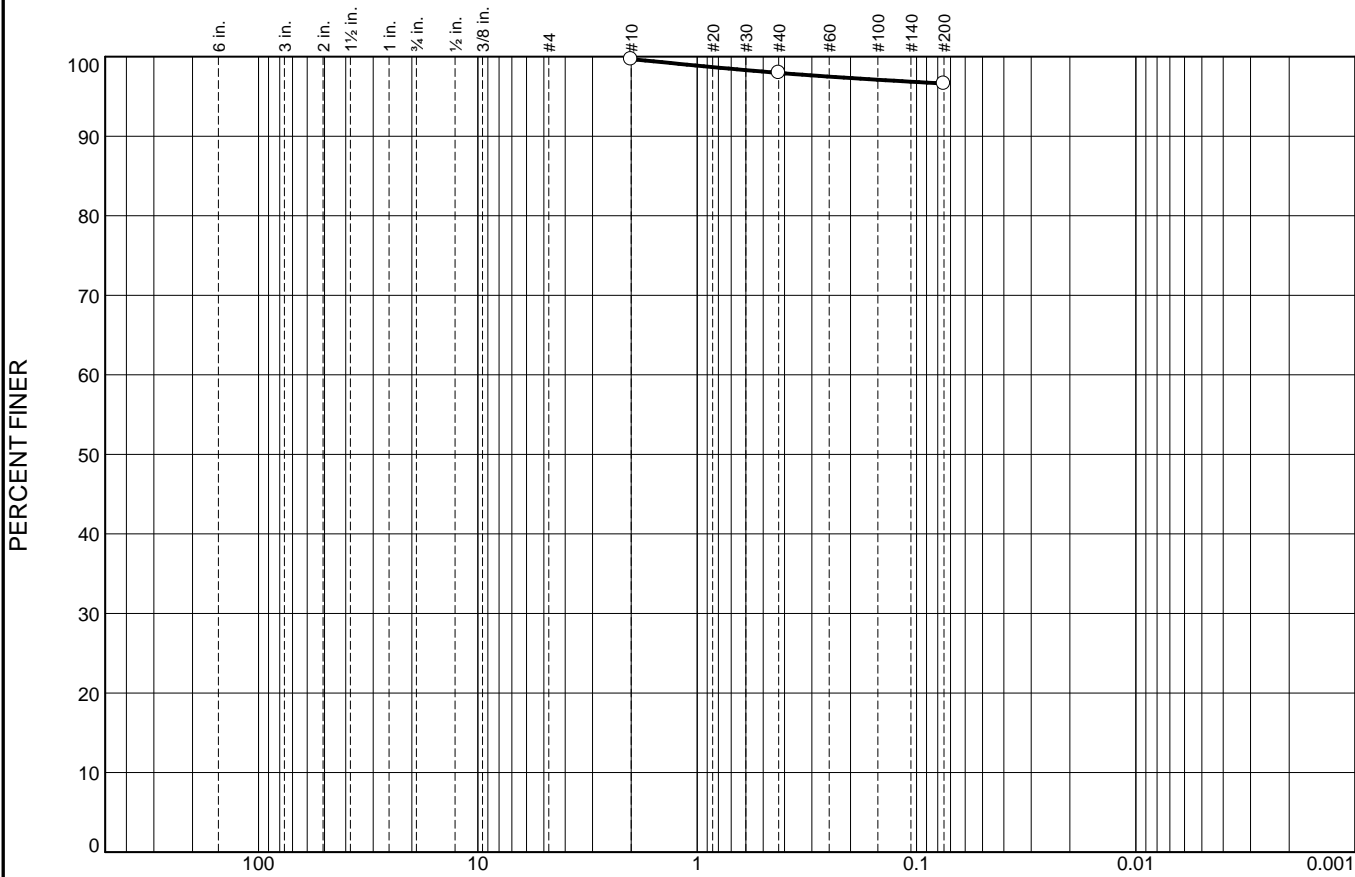
	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	BROWN-GRAY, SILTY CLAY	31	23	8	98.0	96.6	CL-ML

Project No. Project: PROIPOSED FARMERS MARKET Source of Sample: B-1 Depth: 2	Client: <div style="border: 1px solid black; height: 40px; margin-top: 10px;"></div>
Materials Testing of Arkansas Little Rock, AR	

Remarks:

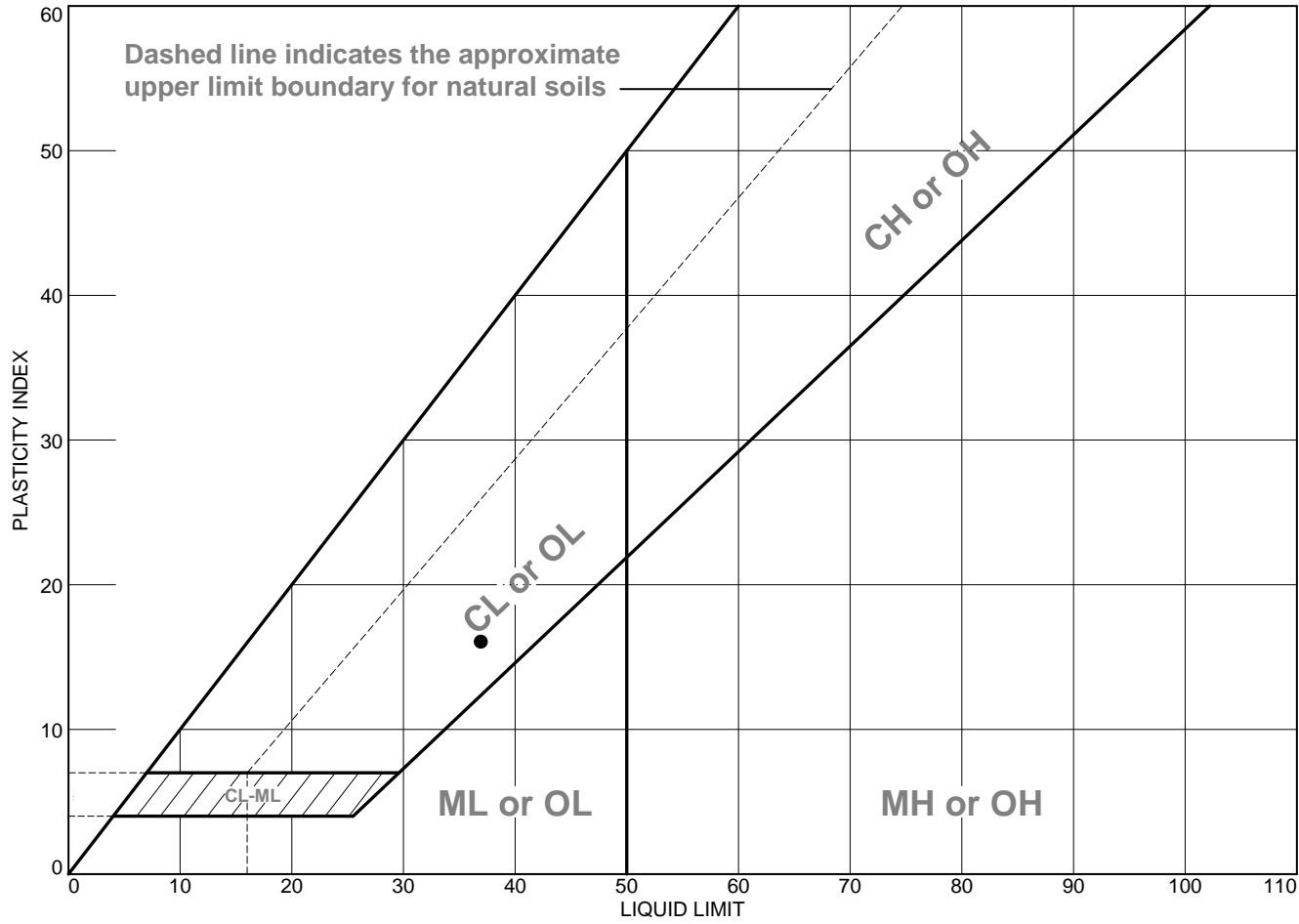
Figure

Particle Size Distribution Report



GRAIN SIZE - mm.										
% +3"		% Gravel		% Sand			% Fines			
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay		
<input type="radio"/>					1.7	1.4	96.6			
<input type="radio"/>										
<input checked="" type="radio"/>	LL	PL	D85	D60	D50	D30	D15	D10	Cc	Cu
<input type="radio"/>	31	23								
<input type="radio"/>										
Material Description								USCS	AASHTO	
<input type="radio"/> BROWN-GRAY, SILTY CLAY								CL-ML	A-4(8)	
Project No. Client:								Remarks:		
Project: PROIPOSED FARMERS MARKET										
<input type="radio"/> Source of Sample: B-1 Depth: 2										
Materials Testing of Arkansas								Figure		
Little Rock, AR										

LIQUID AND PLASTIC LIMITS TEST REPORT

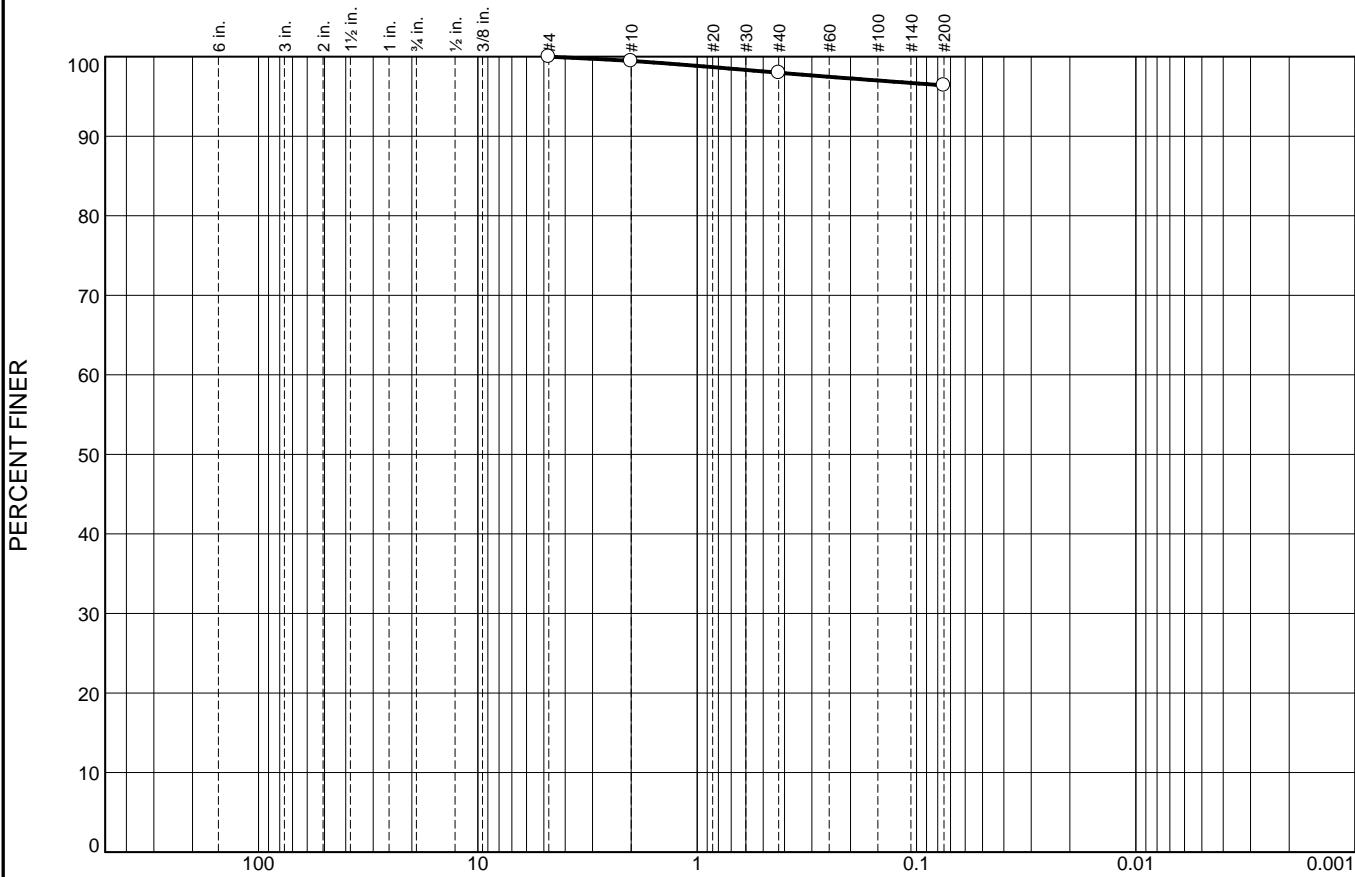


	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	GRAY-BROWN-TRACE RED, LEAN CLAY	37	21	16	98.0	96.4	CL

Project No. Client: Project: PROIPOSED FARMERS MARKET Source of Sample: B-2 Depth: 6	Remarks:
Materials Testing of Arkansas Little Rock, AR	

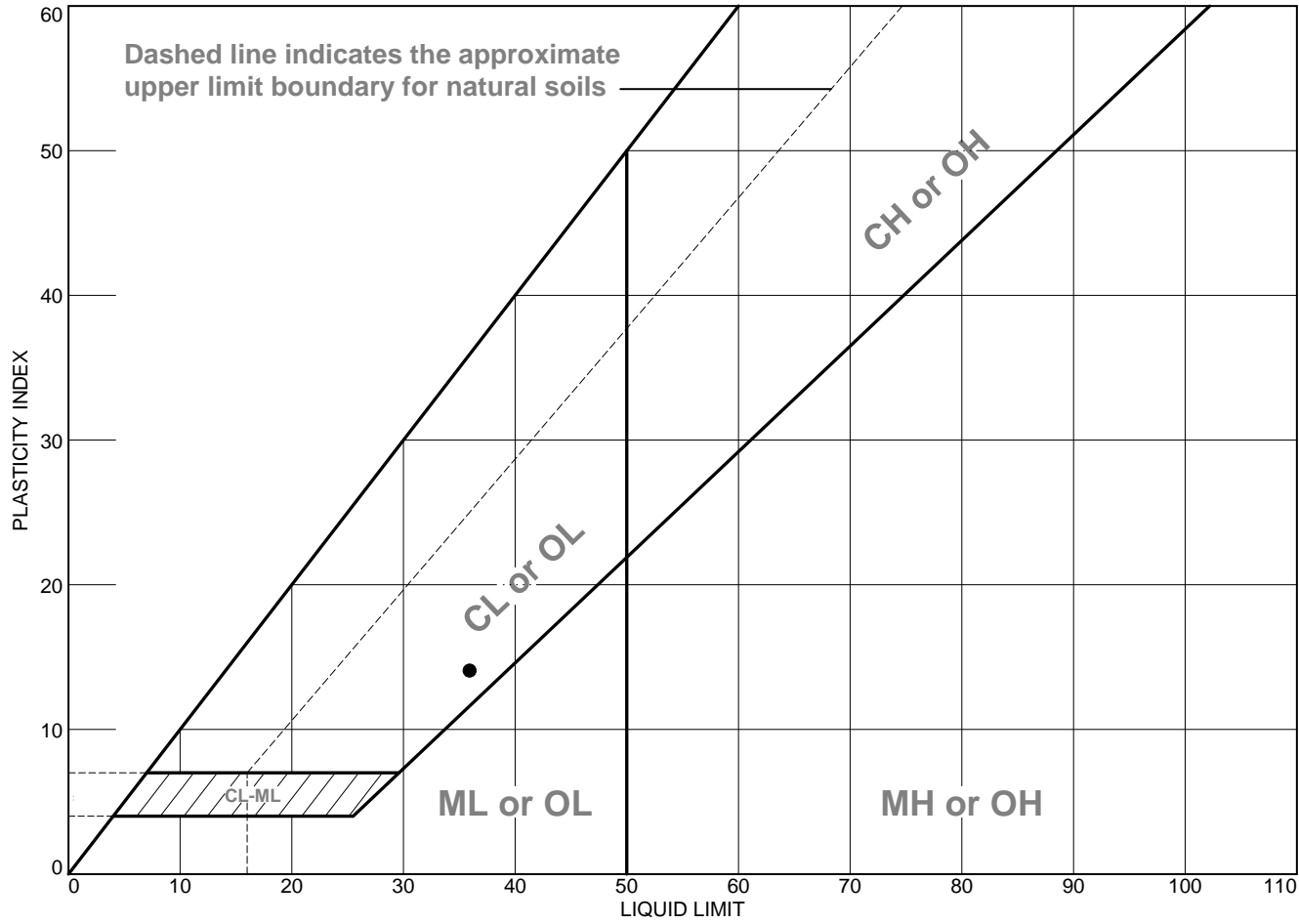
Figure

Particle Size Distribution Report



GRAIN SIZE - mm.										
% +3"		% Gravel		% Sand			% Fines			
		Coarse	Fine	Coarse	Medium	Fine	Silt		Clay	
<input type="radio"/>	0.0	0.0	0.0	0.5	1.5	1.6	96.4			
<input checked="" type="checkbox"/>	LL	PL	D85	D60	D50	D30	D15	D10	Cc	Cu
<input type="radio"/>	37	21								
Material Description								USCS	AASHTO	
<input type="radio"/> GRAY-BROWN-TRACE RED, LEAN CLAY								CL	A-6(16)	
Project No. Client:							Remarks:			
Project: PROIPOSED FARMERS MARKET										
<input type="radio"/> Source of Sample: B-2 Depth: 6										
Materials Testing of Arkansas							Figure			
Little Rock, AR										

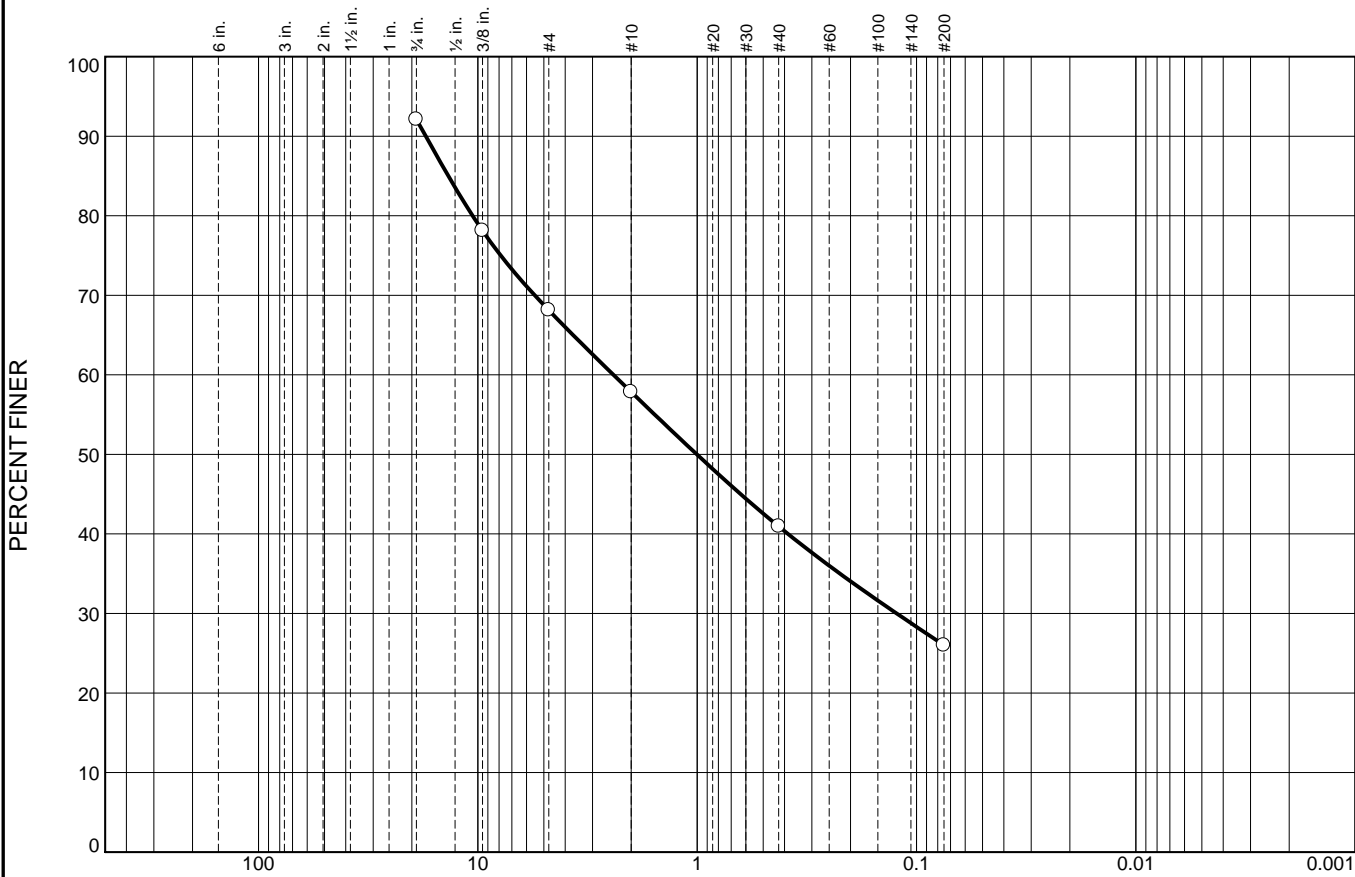
LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	BLACK-BROWN, CLAYEY SANDS W/ FINE GRAVELS	36	22	14	40.9	26.0	SC

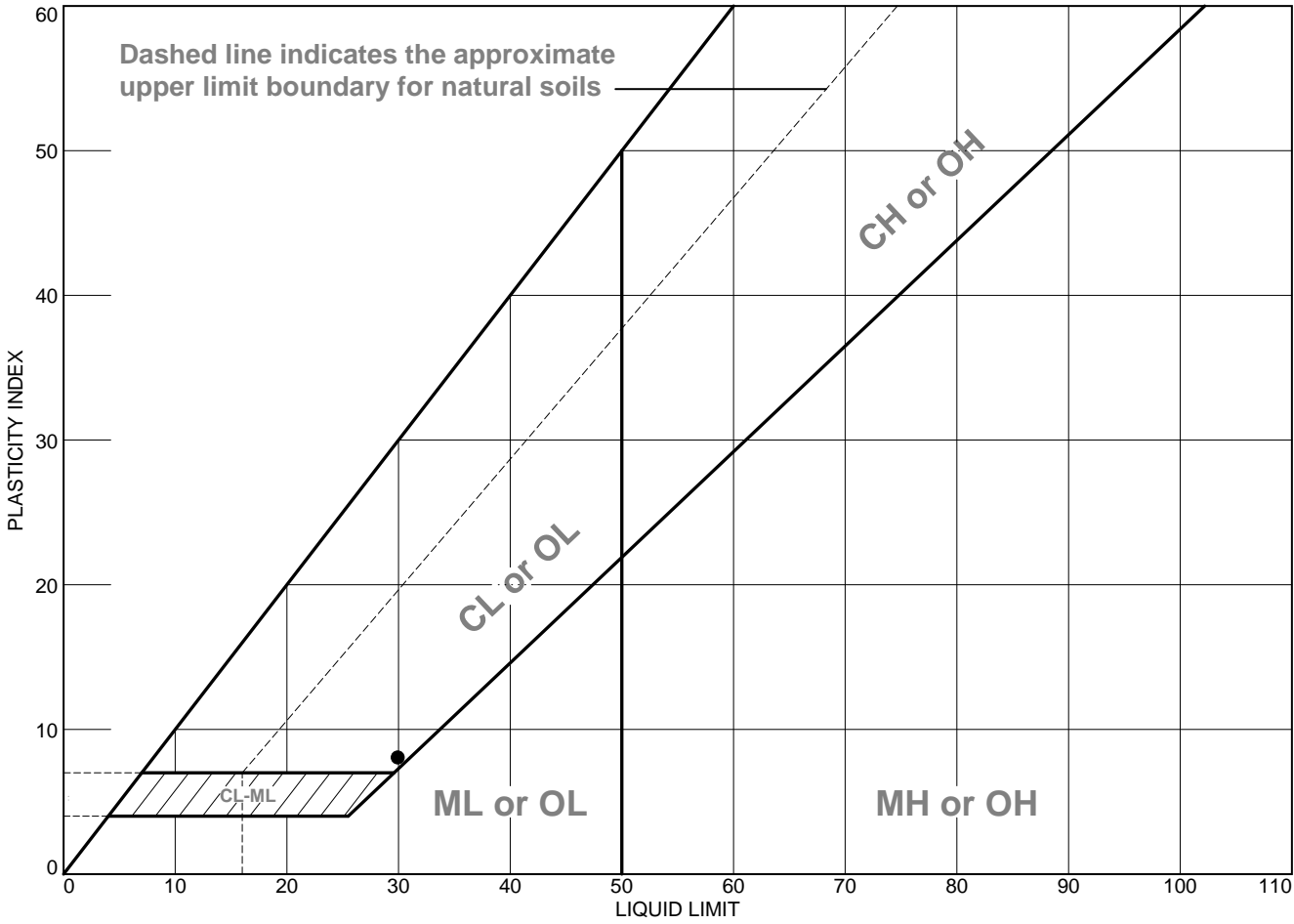
Project No. _____ Client: _____ Project: PROIPOSED FARMERS MARKET ● Source of Sample: B-3 Depth: 2 <div style="text-align: center; border-top: 1px solid black; padding-top: 5px;"> Materials Testing of Arkansas Little Rock, AR </div>	Remarks: <div style="text-align: right; padding-top: 20px;">Figure</div>
--	--

Particle Size Distribution Report



GRAIN SIZE - mm.										
% +3"		% Gravel		% Sand			% Fines			
		Coarse	Fine	Coarse	Medium	Fine	Silt		Clay	
<input type="radio"/>			24.0	10.2	17.0	14.9	26.0			
<input type="radio"/>										
<input checked="" type="radio"/>	LL	PL	D85	D60	D50	D30	D15	D10	Cc	Cu
<input type="radio"/>	36	22	13.6295	2.4082	1.0035	0.1231				
<input type="radio"/>										
Material Description								USCS	AASHTO	
<input type="radio"/> BLACK-BROWN, CLAYEY SANDS W/ FINE GRAVELS								SC	A-2-6(0)	
Project No. Client:								Remarks:		
Project: PROIPOSED FARMERS MARKET										
<input type="radio"/> Source of Sample: B-3 Depth: 2										
Materials Testing of Arkansas								Figure		
Little Rock, AR										

LIQUID AND PLASTIC LIMITS TEST REPORT

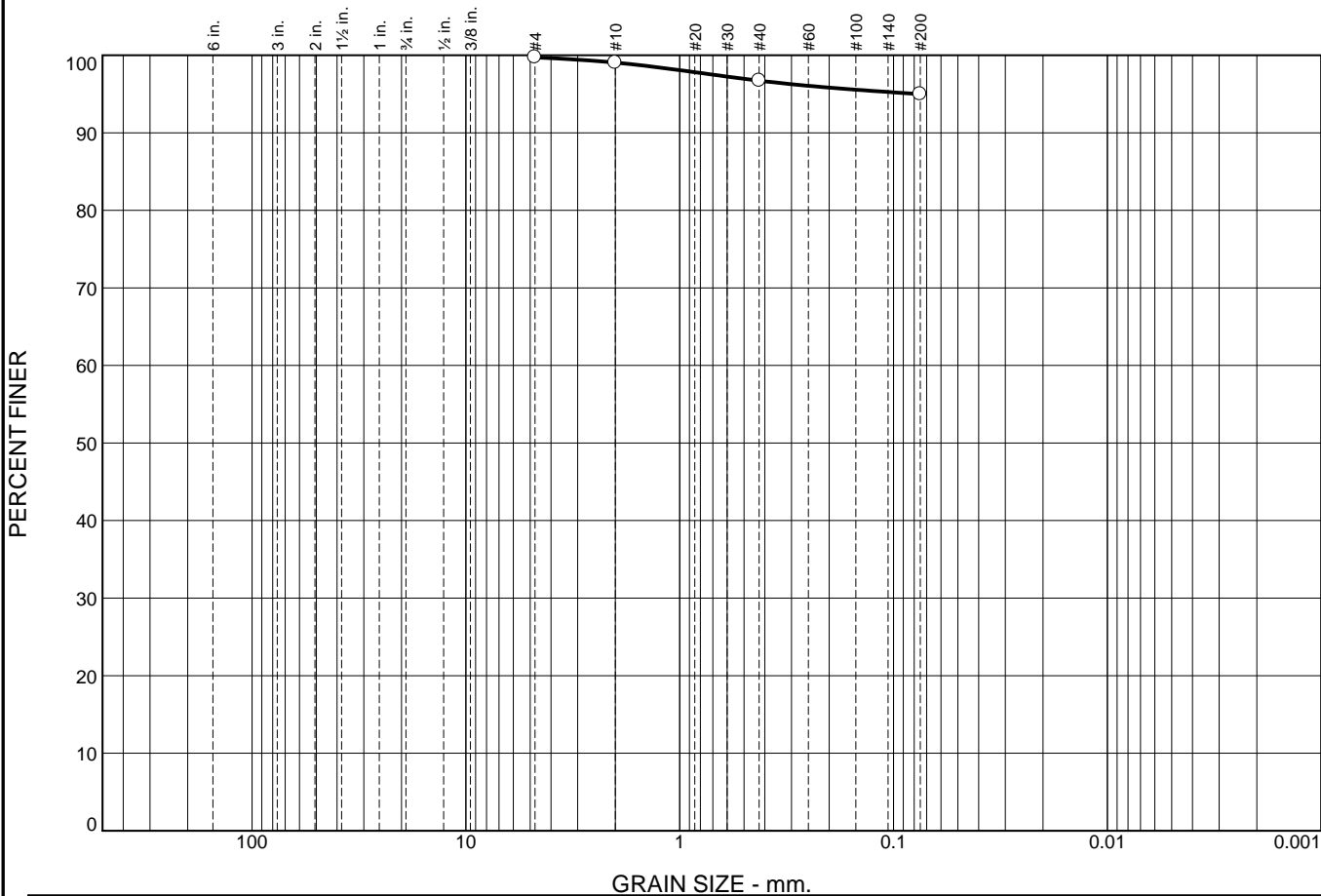


	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	GRAY-TRACE RED, SILTY CLAY	30	22	8	96.7	95.0	CL

Project No. _____ Client: _____ Project: PROIPOSED FARMERS MARKET ● Source of Sample: B-4 Depth: 3	Remarks:
Materials Testing of Arkansas Little Rock, AR	

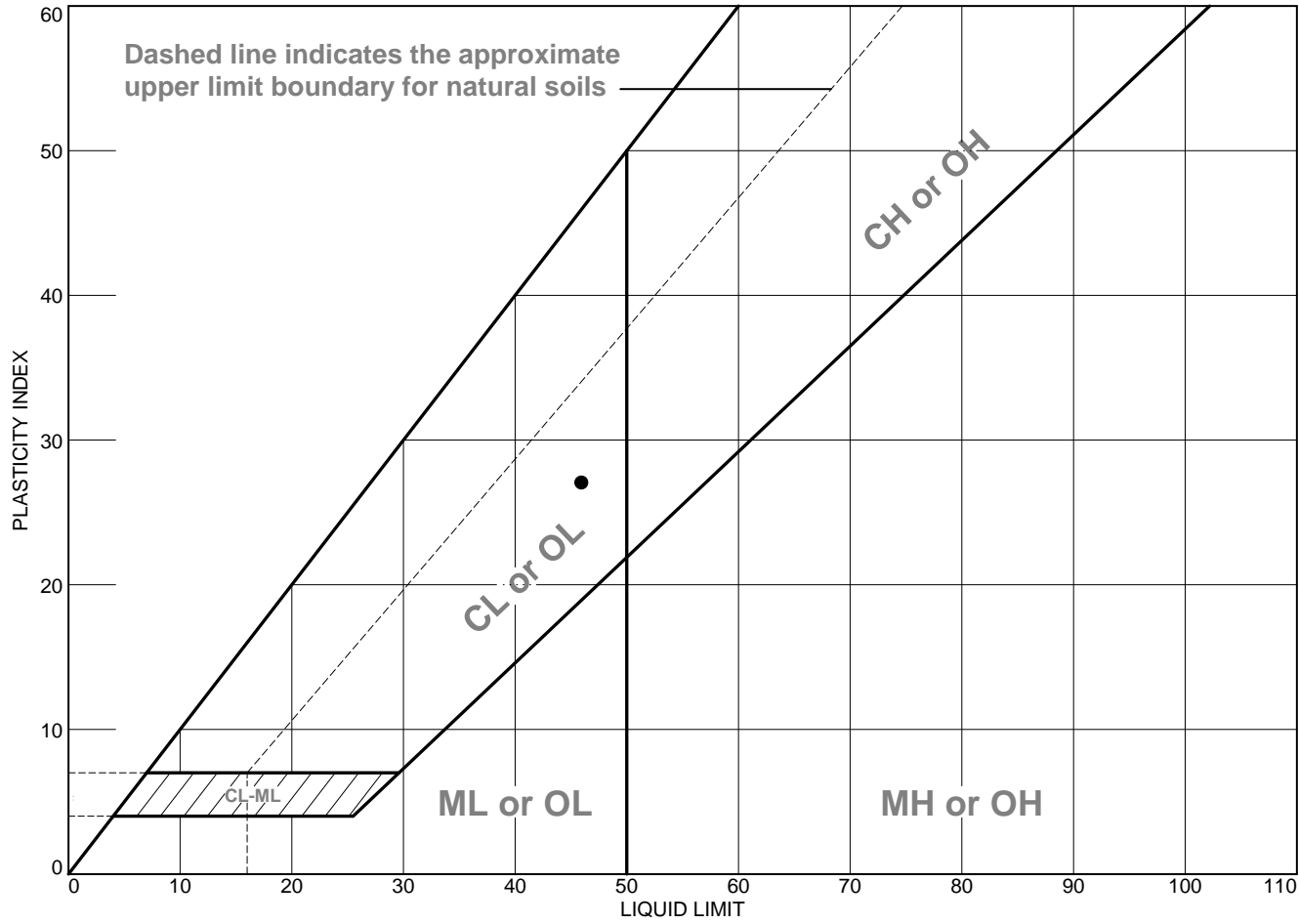
Figure

Particle Size Distribution Report



		% +3"		% Gravel		% Sand			% Fines	
				Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
<input type="radio"/>						0.7	2.3	1.7	95.0	
<input type="radio"/>										
<input checked="" type="checkbox"/>	LL	PL	D85	D60	D50	D30	D15	D10	Cc	Cu
<input type="radio"/>	30	22								
<input type="radio"/>										
Material Description									USCS	AASHTO
<input type="radio"/> GRAY-TRACE RED, SILTY CLAY									CL	A-4(7)
Project No. Client:									Remarks:	
Project: PROIPOSED FARMERS MARKET										
<input type="radio"/> Source of Sample: B-4 Depth: 3										
Materials Testing of Arkansas									Figure	
Little Rock, AR										

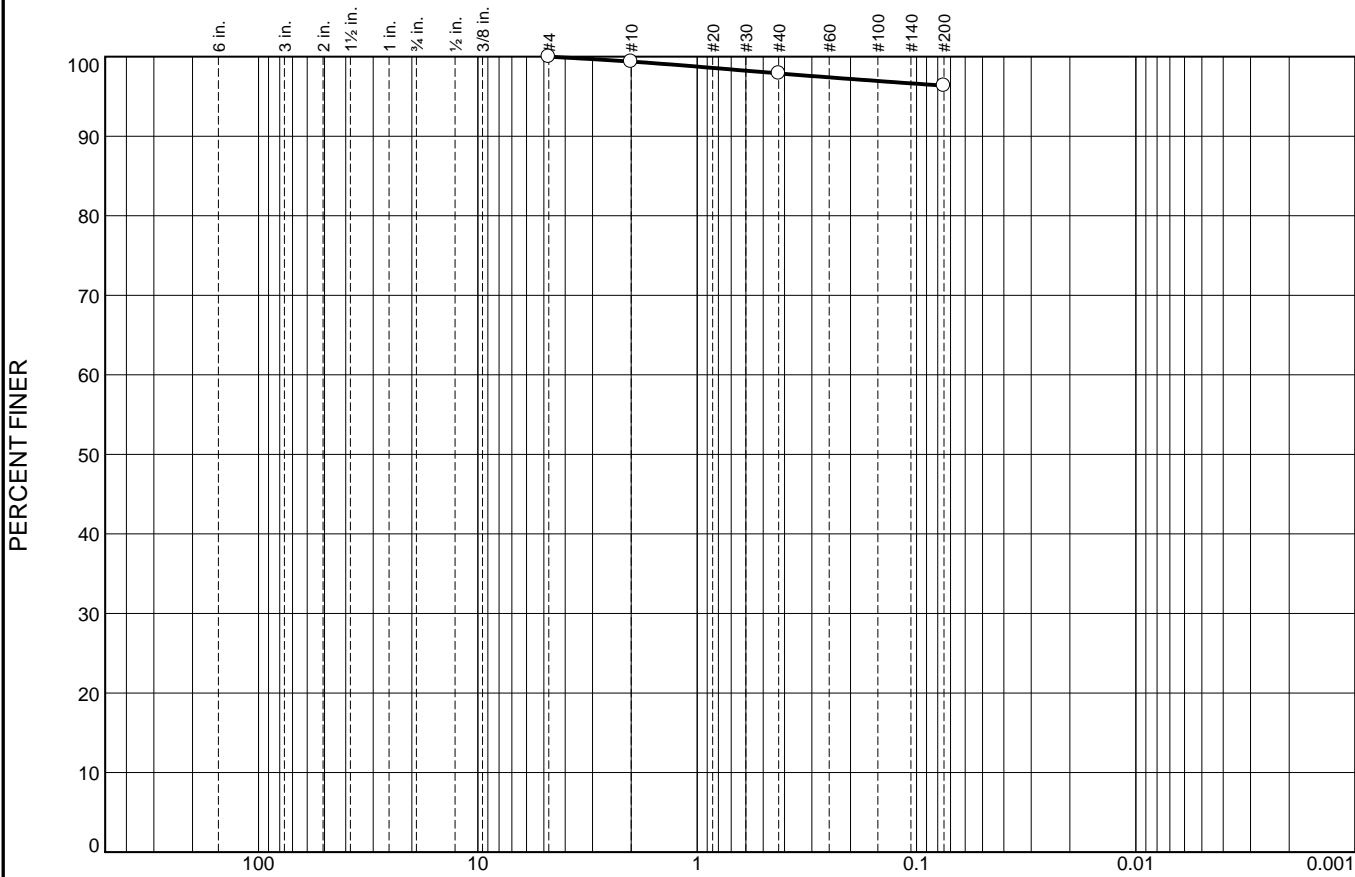
LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	GRAY-RED, CLAY	46	19	27	97.9	96.3	CL

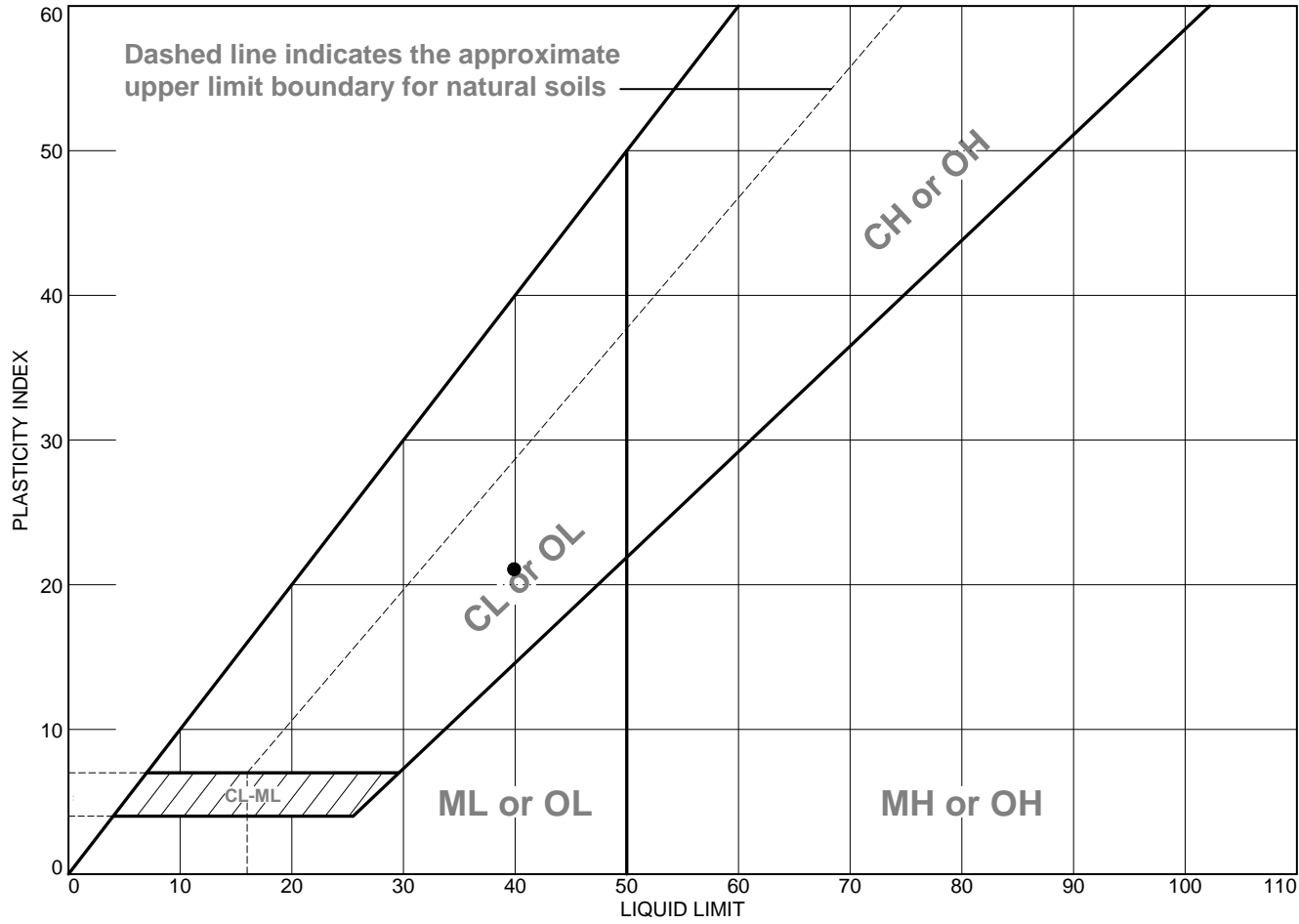
Project No. _____ Client: _____ Project: PROIPOSED FARMERS MARKET ● Source of Sample: B-6 Depth: 4 <div style="text-align: center; border-top: 1px solid black; padding-top: 5px;"> Materials Testing of Arkansas Little Rock, AR </div>	Remarks: <div style="text-align: right; padding-top: 20px;">Figure</div>
--	--

Particle Size Distribution Report



GRAIN SIZE - mm.										
% +3"		% Gravel		% Sand			% Fines			
		Coarse	Fine	Coarse	Medium	Fine	Silt		Clay	
<input type="radio"/>	0.0	0.0	0.0	0.6	1.5	1.6	96.3			
<input checked="" type="checkbox"/>	LL	PL	D85	D60	D50	D30	D15	D10	Cc	Cu
<input type="radio"/>	46	19								
Material Description								USCS	AASHTO	
<input type="radio"/> GRAY-RED, CLAY								CL	A-7-6(28)	
Project No. Client:							Remarks:			
Project: PROIPOSED FARMERS MARKET										
<input type="radio"/> Source of Sample: B-6 Depth: 4										
Materials Testing of Arkansas							Figure			
Little Rock, AR										

LIQUID AND PLASTIC LIMITS TEST REPORT

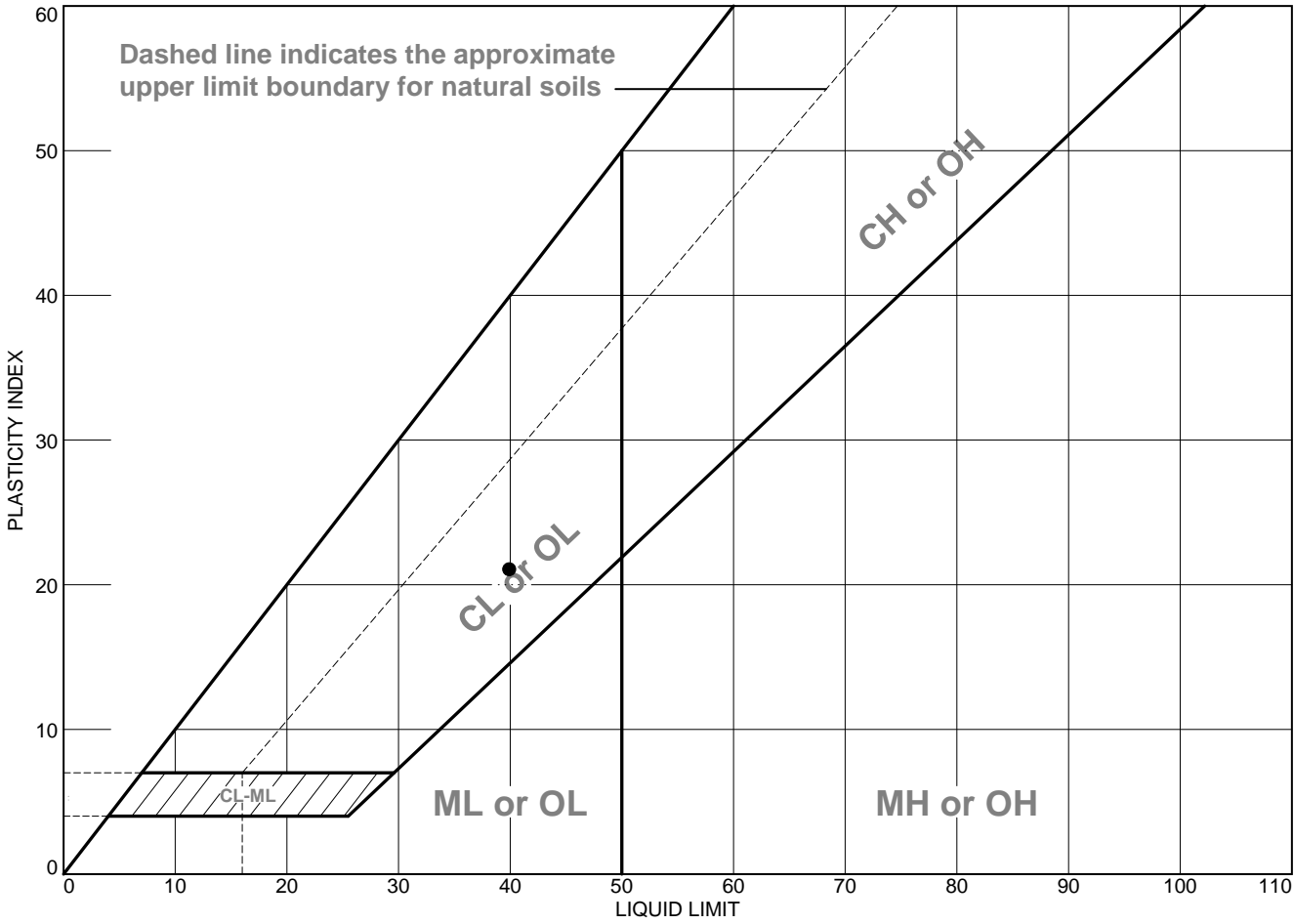


	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	GRAY-RED, SANDY CLAY	40	19	21		52.2	CL

<p>Project No. _____ Client: _____</p> <p>Project: PROIPOSED FARMERS MARKET</p> <p>● Source of Sample: B-7 Depth: 2</p>	<p>Remarks:</p>
<p>Materials Testing of Arkansas</p> <p>Little Rock, AR</p>	

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	GRAY-RED, SANDY CLAY	40	19	21		52.2	CL

Project No. Project: PROIPOSED FARMERS MARKET	Client: Source of Sample: B-7 Depth: 2	Remarks:
Materials Testing of Arkansas		
Little Rock, AR		

Figure

Appendix E: Seismic Design Criteria

Search Information

Coordinates: 36.057088294740815, -90.48438776389312

Elevation: 275 ft

Timestamp: 2021-07-16T18:39:17.794Z

Hazard Type: Seismic

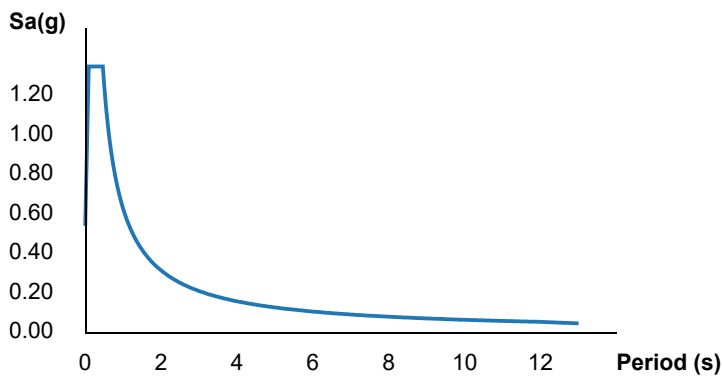
Reference Document: IBC-2015

Risk Category: II

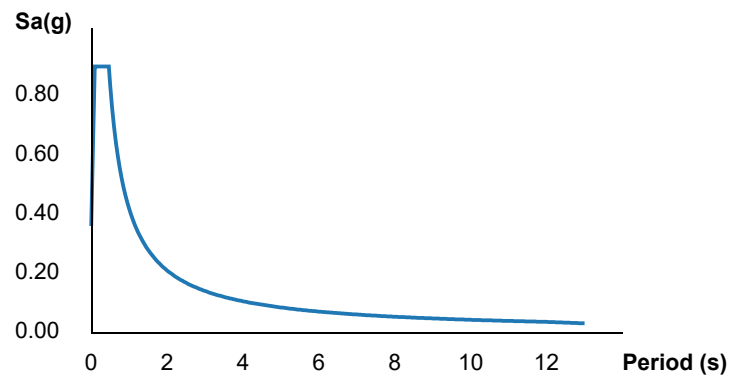
Site Class: C



MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	1.347	MCE_R ground motion (period=0.2s)
S_1	0.47	MCE_R ground motion (period=1.0s)
S_{MS}	1.347	Site-modified spectral acceleration value
S_{M1}	0.625	Site-modified spectral acceleration value
S_{DS}	0.898	Numeric seismic design value at 0.2s SA
S_{D1}	0.417	Numeric seismic design value at 1.0s SA

Additional Information

Name	Value	Description
SDC	D	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.33	Site amplification factor at 1.0s
CR_S	0.796	Coefficient of risk (0.2s)

CR_1	0.8	Coefficient of risk (1.0s)
PGA	0.709	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.709	Site modified peak ground acceleration
T_L	12	Long-period transition period (s)
SsRT	1.347	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.692	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.534	Factored deterministic acceleration value (0.2s)
S1RT	0.47	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.587	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.6	Factored deterministic acceleration value (1.0s)
PGAd	0.709	Factored deterministic acceleration value (PGA)

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are provided by the U.S. Geological Survey [Seismic Design Web Services](#).

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SECTION 02110 SITE PREPARATION

PART 1 GENERAL

1.1 PROVISIONS

- A. Throughout the specifications, types of materials may be specified by manufacturer's name and catalogue number in order to establish standards of quality and performance and not for the purpose of limiting competition. Alternate methods and/or materials may be submitted to the Engineer for consideration. Those judged to be equal to that specified will receive written approval.

1.2 DESCRIPTION

- A. Work covered by this section includes furnishing of and paying for all materials, labor, services, equipment, licenses, taxes, other items, and appliances necessary for the execution, installation and completion of all work specified herein and/or shown on the drawings.
- B. The Work described in this section of the specifications includes, but is not limited to, the following:
 - 1. Site clearing in preparation for grading and excavation.
 - 2. All debris and surplus soil undercut shall be disposed of off site in strict accordance with governing regulatory agencies. Any dumping in public waters such as lakes, streams, floodways is strictly prohibited. The contractor may be required to present a consent letter from the property owner for permitted dumping.
 - 3. Compliance with applicable air pollution control regulations.
 - 4. Procuring permits for transportation of debris and surplus soil to disposal site, and dust permits.

1.3 SUBMITTALS

- A. Permit, Notices, Etc.: Submit for the record copies of permits and notices, and certificates of severance of utility services. No copies will be returned.

1.4 ENVIRONMENTAL CONDITIONS

- A. Protect plant growth and features remaining as final landscaping, and bench marks and existing construction from damage or displacement.

- B. Maintain designated site access for vehicle and pedestrian traffic.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 CLEARING

- A. Clear areas required for access to site and execution of Work.
- B. Remove following except those designated to remain:
 - 1. Existing surface vegetation and other organic materials.
 - 2. Underground facilities including septic tanks and cesspools.
 - 3. Abandoned utility lines.
 - 4. Construction rubble and debris, existing fill or backfill, and unstable soils within 10 feet of the Building and within driveway and parking lot area.
- C. Clear undergrowth and deadwood, without disturbing subsoil.
- D. Perform demolition in accordance with applicable authorities having jurisdiction.
- E. Assume possession of materials being demolished, unless indicated otherwise.
- F. Carefully remove and deliver materials and equipment to be retained by Owner, such as cornerstones, their contents, commemorative plaques and tablets, to Owner when and where directed.
- G. Sprinkle area with water to prevent dust. Provide and maintain hoses and connections to watermain or hydrant.
- H. Do not burn materials on site.
- I. Pump out buried tanks located outside building proper. Remove tanks and service piping from site.
- J. Immediately upon discovery, remove and dispose of contaminated, vermin infested, or dangerous materials by safe means so as not to endanger health of workers and public.
- K. Remove trees and shrubs within marked areas, clear undergrowth and dead plant material.

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- L. Backfill open pits and holes caused by demolition in accordance with Section 02210.
- M. Remove demolished materials, tools and equipment upon completion of work. Leave site in acceptable condition.

END OF SECTION

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SECTION 02200
EARTH WORK

PART 1 GENERAL

1.1 DESCRIPTION

A. Work Included

Excavating, filling, and grading for this work includes, but is not necessarily limited to:

1. Undercutting beneath foundation and slab;
2. Excavating for grade beams;
3. Filling to attain indicated grades;
4. Rough and finish grading of the site;
5. Excavation for drainage system;
6. Excavation at sidewalks.

B. Related Work Described Elsewhere

- | | |
|---------------------|---------------|
| 1. Quality Control | Section 01400 |
| 2. Site Preparation | Section 02110 |

C. Definitions

The words "finished grade", as used herein mean the required final grade elevations indicated on the drawings. Where not otherwise indicated, project site areas outside of building shall be given uniform slopes between points for which finished grades are shown, or between such points and existing grade, except that vertical curves or roundings shall be provided at abrupt changes in slope.

1.2 JOB CONDITIONS

A. Dust Control

1. Use all means necessary to control dust on and near the work.
2. Thoroughly moisten all surfaces as required to prevent dust being a nuisance to the public, neighbors, and concurrent performance of other work on the site.

PART 2 PRODUCTS

2.1 FILL MATERIAL, GENERAL

Fill material shall be as specified in Part 3 - Execution.

PART 3 EXECUTION

3.1 STRIPPING OF TOPSOIL

Remove all existing organic topsoil within the root zone, this may be stockpiled and used as a partial requirement for topsoil. It shall be the responsibility of the Contractor to provide the required amount of topsoil. Do not strip topsoil in a muddy condition and avoid admixture of debris. Stock the stripped topsoil within the site at locations approved by the Engineer and where it will not hinder construction operations. Topsoil shall be suitable for plant growth and approved by Architect prior to use at job site.

3.2 ENVIRONMENTAL CONDITIONS

A. Drainage

Special attention shall be given to immediately draining all areas holding surface water and establishing surface drainage before commencing with filling or excavation. Surface drainage shall be maintained throughout the project to prevent surface ponding and subsequent saturation of the subgrade soil.

B. Temporary Drainage

1. Where natural drainage is interfered with, provide temporary drainage system until such time as permanent system is installed and functioning.
2. Temporary drainage system shall be so installed as not to create a nuisance in adjacent property.
3. Keep excavations free of water during entire progress of work, with methods or systems being maintained and properly supervised at all times.
4. Springs encountered shall be brought to the attention of the Engineer. Presence of ground water in the soil shall not constitute a condition for which any increase may be made in the contract price.

3.3 EXCAVATING, FILLING AND GRADING

A. Excavating

1. Grades, Dimensions

For buildings, excavate to elevations and dimensions indicated, plus ample space for construction operations and inspection of foundation. Remove any soft soil pockets or other unsuitable materials encountered at bearing depth. The site should be proof-rolled with a minimum 20,000 lb. pneumatic-tired roller, loaded tandem-wheeled dump truck, or similar equipment to identify by the proof rolling process areas that should be

undercut and be processed and recompact or replaced with approved select fill.

2. Obstruction

Remove entirely all obstructions from the locations of new foundations; elsewhere within the lines of new buildings, remove such obstruction a depth of 2' 0" below required grade as shown on the drawings. Clean out any existing dug wells, cisterns, abandoned manholes, catch basins, and other similar structures, and fill with granular material firmly compacted.

3. Classified Excavation

All excavation under this Section shall be unclassified and no allowance shall be made for classification regardless of the materials encountered. Remove all materials required to perform excavation, including rock, etc.

4. Shore, sheet and/or brace excavations as required by OSHA to maintain them secure, remove shoring as the backfilling progresses, but only when banks are safe against caving. Such shoring shall not constitute a condition for which any increases may be made in the Contract Price.

5. Drainage

Keep excavations free from water. Do not discharge water from excavations onto privately owned property where harmful erosion will result.

6. Frost Protection

Make no excavations to the full depth indicated when freezing temperature may be expected, unless the footings or slabs can be poured immediately after the excavation has been completed. Protect the bottom of excavation from frost if placing of concrete is delayed.

7. Disposal

Remove from the site, and dispose of all debris and all excavated materials not suitable or needed for fill.

8. Bearing Surfaces

Bearing surfaces shall be level, free of all loose material; recompact to overcome disturbances.

9. After excavations have been dug for indicated footings, notify the Architect prior to placing concrete for his observation.

B. Filling and Grading

1. Grades

Do all cutting, filling, backfilling and grading required to bring the entire project area to subgrades as follows:

- a. For surfaces areas: including walks, to the underside of the respective surfacing and/or surfacing base course as fixed by the finished grades.
- b. For lawn and planted areas: to 4" below finished grade. Unless otherwise shown on the drawings, slope the subgrade evenly to provide drainage away from building walls in all directions at a grade of 1/4" per foot minimum for at least 10 feet from the building walls.

2. Fill Material

Fill required for backfill or to raise existing grade shall consist of clayey sand (SC), sandy clay (CL), or clayey gravel (GC) having a liquid limit less than 40, or an approved alternative. Fill soils in the building and paving areas and within 5 feet of the building or paving areas shall be compacted to a minimum of 95 percent of maximum Modified Proctor dry density (ASTM D-1557), with a moisture content range of minus 2 to plus 3 percent of optimum.

3. Site Fill

In landscaped areas, compaction criteria may be reduced to a minimum of 90 percent of maximum Modified Proctor dry density (ASTM D-1557) at a moisture content near optimum. Fill should be placed in maximum 8-inch loose lifts. Each lift of fill should be properly compacted, tested, and approved prior to placing subsequent lifts.

4. Place fill in uniform layers. Fill shall be placed in loose lifts no greater than 8" in thickness and properly compacted as specified under building

and pavements. The in-place density and moisture content shall be established for each lift prior to placement and subsequent lifts. Compact "cut" or "virgin" material on which fill material is to be place shall be proof-rolled to verify stability prior to placing fill material. If a thick initial lift is used for "bridging" over soft pockets the top 8" of the initial lift shall be compacted to the density required for the fill above.

5. Sand

Washed river sand free of all foreign matter.

6. Gravel Drainage Fill

Washed river gravel, graded from 1/4" to 1/2"; (1" to 2" for use around trees). Gravel shall be thoroughly consolidated with vibrating equipment.

7. Top soil 4" deep at non-paved areas.

3.3 DISPOSITION OF UTILITIES

Rules and regulations governing the respective utilities shall be observed in executing all work under this heading. Active utilities shown on the drawings shall be adequately protected from damage, and removed or relocated only as indicated or specified. Active utilities not shown on the drawings shall be protected or relocated in accordance with written instructions of the Engineer. Inactive and abandoned utilities encountered in excavating and grading operation shall be removed, plugged or capped. In absence of specified requirements, plug or cap such utility lines at least 3 feet outside of new building walls or as required by the local regulations.

3.4 FINISH GRADING

Remove all debris and re-grade as necessary to bring rough grade to a uniform surface. Spread topsoil to a minimum depth of 4" over all areas that were graded (cut or filled) which are not to be paved. All areas 10' from new construction, shall require 4" of topsoil. Grade to a smooth uniform surface conforming to finish grades or cross sections indicated on the drawings. Clean finished surface of all stones, roots, or other undesirable foreign matter and remove from project site.

3.5 GENERAL

Complete the grading operations after buildings have been finished, utilities installed, site improvement constructed, and all materials, rubbish and debris removed from the site. Leave subgrade for lawns and planted areas clean and at required grades.

END OF SECTION

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SECTION 02210 - GRADING

PART 1 GENERAL

1.1 PROVISIONS

Throughout the specifications, types of materials may be specified by manufacturer's name and catalogue number in order to establish standards of quality and performance and not for the purpose of limiting competition. Alternate methods and/or materials may be submitted to the Engineer/Architect for consideration. Those judged to be equal to that specified will receive written approval.

1.2 DESCRIPTION

- A. Work covered by this section includes furnishing all materials, labor, services, equipment, licenses, taxes, other items, and appliances necessary for the execution, installation and completion of all work specified herein and/or shown on the drawings.
- B. The Work described in this section of the specifications includes, but is not limited to the following:
 - 1. Excavation, stockpiling and disposal of topsoil and subsoil, rough/fine grading and contouring of site in preparation for site.

1.3 RELATED WORK

- A. The following items of related work are specified and included in other sections of these specifications:
 - 1. Section 02110 - Site Preparation.

1.4 REFERENCE STANDARDS

- A. ASTM D698-Latest - Tests for Moisture-Density Relations of Soils and Soil Aggregate Mixtures using 5.5 lb. hammer and 12 inch drop.
- B. ASTM D1557-Latest - Tests for Moisture-Density Relations of Soils and Soil Aggregate Mixtures using 10 lb. hammer and 18 inch drop.

1.5 SUBMITTALS

- A. Project Record Documents:
 - 1. Submit documents in accordance with Section 01000 - General Requirements.

2. Maintain existing utilities and accurately record location of newly encountered utilities remaining, rerouted utilities, new utilities by horizontal dimensions, elevations or inverts, and slope gradients.

PART 2 PRODUCTS

2.1 FILL MATERIALS

- A. Clean soils free of vegetation, debris and organic contaminants with:
 1. On site silty to sandy clay (CL) should be suitable for use as fill material (see soils report).
 2. Use fat clay (CH) only in non-structural fill areas such as ball field areas.
 3. Use fat clay (CH) as liner material for the pond (6" to 12" thick).
 4. Consult soils report to determine usability of soil as fill material.
 5. Use site excavated material for site fill material.
 6. Maximum plasticity index of 15 as determined in accordance with ASTM D4318.
 7. Comply with Paragraph 3.5 A. Section 02210.
- B. Select clayey sand (SC) or clayey gravel (GC) or sandy clay (CL) with liquid limit less than 40.

PART 3 EXECUTION

3.1 PREPARATION

- A. Perform construction staking and site layout using horizontal and vertical control points provided on the drawings
- B. Identify and maintain required lines, levels, contours, and baseline points.
- C. Identify, maintain and protect existing utilities which pass through construction area.
- D. Notify utility company to remove and relocate utilities when required for construction.
- E. Upon discovery of unknown utility or concealed conditions, discontinue affected construction and notify Engineer/Architect.

3.2 EXCAVATION

- A. Strip topsoil (approximately 8 inches) and stockpile for later use.
- B. Excavate to elevations and grades indicated.
- C. Widen depressions to accommodate compaction equipment and provide a level base for placing fill.
- D. Stockpile excavated material to be reused on site where directed, not higher than 6 feet and with maximum 25 percent slope. Cover stockpiles to prevent erosion.
- E. Grass, grass roots and incidental topsoil shall not be left beneath a fill area nor shall this material be used as fill material. It may be stockpiled for later use in the top 6 inches of fills outside building pads and roadways.
- F. Remove unusable and surplus material to designated site. (Future community center see drawing for location).
- G. The detention ponds bottoms should be scarified and compacted. Top 6 inches of the bottom should have CL material. The in-situ clay (CL) soils should be used as the liner material scarified and re-compacted. Minimum permeability should be 1×10^{-5} cm/sec. Where cohesionless soils are encountered in the pond bottom or slopes, a clay liner will be required. The in-situ CL material should be used.

3.3 SCARIFICATION

- A. Scarify, adjust moisture, and compact exposed natural surface soils to minimum 12 inch depth in all fill areas. Bring the upper 12 inches to optimum moisture content or above as determined in ASTM D1557.
- B. Scarify undisturbed surfaces which receive fill to depth of 6 inches.

3.4 FILL

Fill required for low areas shall be placed in 8 inch loose lifts, within two percentage points of optimum, and compacted to 95% Modified Procter (ASTM D 1557).

- A. Place and compact fill material in continuous layers not exceeding twelve (12) inches loose depth. Maintain optimum moisture content in fill materials to obtain required compaction density.
- B. Deeper lifts may be authorized when proposed equipment is proven to compact deeper lifts.
- C. Controlled fill shall not be constructed when the atmospheric temperature is below 35°F. When the temperature falls below 35°F, it shall be the responsibility of the

contractor to protect all areas of completed surface against any detrimental effects of ground freezing by methods approved by the geotechnical engineer. Any areas that are damaged by freezing shall be reconditioned, reshaped, and compacted by the contractor in conformance with the requirements of this specification without additional cost to the Owner.

3.5 COMPACTION

- A. Use mechanical compaction equipment which will not disturb adjacent structures. Do not use water settling and jetting methods.
- B. Compact fill materials in accordance with ASTM D1557.
- C. Rework, moisten or dry as required, and compact exposed surface and subgrade soils to minimum depth of 8 inches. Reworking may be accomplished by scarification, dicing, removal and replacement or other method which will result in uniform moisture contents and densities.
- D. Compact soils within following ranges of moisture content:
 - 1. On-Site Subgrade Soils: 2 percent below optimum or higher.
 - 2. Imported Soils: Minimum weight of 125.0 of pcf placed at +1 to +3 of optimum moisture.
 - 3. Subgrade Soil and Fill Below Asphaltic Pavement: 2 percent below optimum or higher.
- E. Compact fill materials to following minimum percent compaction:
 - 1. Native Soils and Subbase Fill:
 - a. Below footings 95 percent
 - b. Below concrete slabs-on-grade 95 percent
 - 2. Subbase Fill:
 - a. Below footings 95 percent
 - b. Below concrete slabs-on-grade 95 percent
 - 3. Miscellaneous Backfill outside of building pad (Not Intended for Lateral Support of Pipelines): 95 percent

3.6 SUBGRADE PREPARATION

Maintain subgrade of areas to be covered with structural fill or aggregate base course in moist condition until covered.

3.7 GRADING TOLERANCES

- A. Subgrade: Within 0.5 feet from grades and cross section indicated.
- B. Ball Fields: Within 0.2 feet from grades
- C. Variations Within Tolerances: Compensating so that average grade and cross-section are met.

3.8 OBSERVATION AND TESTING OF WORK

- A. Observation and testing shall be performed by an independent geotechnical testing laboratory in accordance with Section 01000, General Requirements.
- B. Testing shall be performed so as to least encumber construction.
- C. When tests indicate that compacted materials do not meet specified requirements, correct defective construction, and have construction retested.
- D. Ensure compacted fills are tested before proceeding with placement of surface materials.
- E. Tests of fill materials and embankments will be made at the following minimum rates:
 - 1. One field density test for each 5,000 square yards of original ground surface prior to placing fill or constructing floor slabs.
 - 2. One field density test for each 250 cubic yards of fill placed or each layer of fill for each work area, whichever is the greater number of tests.
 - 3. One moisture-density curve for each type of material used, as indicated by sieve analysis and plasticity index.
 - 4. The contractor shall bear the cost all required testing.

3.9 PROTECTION

- A. Protect trees, shrubs, and other features remaining as portion of final landscaping.
- B. Protect bench marks, property monuments, walls, fences, roads, sidewalks paving and curbs.

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- C. Protect above or below grade utilities which are to remain.
- D. Protect newly graded areas from traffic and erosion, keep areas free of trash and debris. Repair and reestablish grades in settled, rutted, or eroded areas.
- E. Repair damage.

END OF SECTION 02210

SECTION 02220
EXCAVATING, BACKFILLING AND COMPACTING

PART 1 GENERAL

1.1 PROVISIONS

Throughout the specifications, types of materials may be specified by manufacturer's name and catalogue number in order to establish standards of quality and performance and not for the purpose of limiting competition. Alternate methods and/or materials may be submitted to the Engineer for consideration. Those judged to be equal to that specified will receive written approval.

1.2 DESCRIPTION

- A. Work covered by this Section includes furnishing all labor, materials, services, appliances, licenses, taxes, and equipment necessary for the execution, installation and completion of all work specified herein and/or shown on the drawings.
- B. The Work described in this section of the specifications includes, but is not limited to, the following:
 - 1. Excavating, backfilling and compacting for structures, utilities, driveways, curbs, gutters, sidewalks and other hardscape.

1.3 RELATED WORK

- A. The following items of related work are specified and included in other sections of these specifications:
 - 1. Section 02110 - SITE PREPARATION.
 - 2. Section 02210 - GRADING.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Fill: In accordance with Section 02210.
- B. Bedding Material: Granular material containing no pieces larger than 3/4 inches and free of broken concrete pavement, wood or other deleterious materials. Do not use open graded rock unless approved; sum of plasticity index and percent of material passing No. 200 sieve not to exceed 23.
- C. Base Course: Gravel aggregate base course.

1. Gravel: Fully or partially rounded and water-worn particles with uniformly distributed crushed rock exceeding ASTM D422 maximum gradation sizes as follows:
 - a. 100% passing 1 inch sieve by weight.
 - b. 85% to 100% passing 3/4 inch sieve by weight.
 - c. 45% to 95% passing No. 4 sieve by weight.
 - d. 10% to 40% passing No. 30 sieve by weight.
 - e. 0% to 8% passing No. 200 sieve by weight.
2. Maximum plasticity index of 3 when tested in accordance with ASTM D4318.
3. Maximum percent of wear of 50 when subjected to Los Angeles abrasion test (ASTM C131).

PART 3 EXECUTIONS

3.1 PREPARATION AND LAYOUT

- A. Maintain baseline points and other reference points throughout the project. Any control point destroyed during the construction shall be re-established by the contractor.
- B. Stake limits of excavation horizontally and vertically by using furnished baseline points.

3.2 PROTECTION

- A. Protect areas to receive planting, and other features specified to remain.
- B. Protect baseline points existing structures, roads, sidewalks, paving, and curbs from damage by equipment and vehicular or foot traffic.
- C. Protect excavations by shoring, bracing, sheet piling, underpinning, or other methods, as required to prevent cave-ins or loose dirt from falling into excavations.
- D. Underpin adjacent structures which may be damaged by excavation work, including service lines and pipe chases.
- E. Notify Engineer of unexpected subsurface conditions and discontinue work in area until Engineer provides notification to resume work.
- F. Protect bottom of excavations and soil around and beneath foundations from frost.

- G. Grade around excavations to prevent surface water run-off from flowing into excavated areas.

3.3 UTILITIES

- A. Before starting excavation, contact A One Call@ at 1-800-482-8998, establish location and extent of underground utilities occurring in work area.
- B. Maintain existing utility lines designated to remain within the work area.
- C. Include costs for maintaining utilities in bid.
- D. Protect utility services uncovered by excavation.
- E. Remove abandoned utility service lines from areas of excavation; cap, plug or seal such lines and identify at grade.
- F. Accurately locate (tie to control points) and record abandoned and active utility lines rerouted or extended, on Project Record Documents.

3.4 TRENCHING FOR UTILITIES

- A. Do not disturb soil within branch spread of existing trees or shrubs designated to remain. When necessary to excavate through roots, excavate by hand, tunnel through roots where possible and cut roots with sharp ax where tunneling is not possible.
- B. Where trenches lie within concrete or asphaltic concrete pavement sections, sawcut to neat, vertical, true lines without damage to adjoining surfaces.
- C. Accurately grade trench bottom to specified lines and grades and provide uniform bearing and support for each section of pipe at every point along its entire length. Trim and shape trench bottoms and leave free of irregularities, lumps and projections.
- D. Brace, sheath or shore as necessary to perform and protect excavation and personnel.
- E. Minimize length of open trench whenever possible.
- F. Cut trenches sufficiently wide to enable proper installation of services and to allow for inspection, but not in excess of following maximum widths at top of pipe greater than O.D. of barrel and minimum widths at spring line each side of pipe:
 - 1. For Pipe Less than 18 inches (I.D.): 16 inches at top and 6 inches at spring line.
 - 2. For Pipe from 18 through 24 inches (I.D.): 19 inches at top and 7-1/2 inches at spring line.

3. For Pipe from 27 through 39 inches (I.D.): 22 inches at top and 9 inches at spring line.
 4. For Pipe from 42 through 60 inches (I.D.): Half O.D. at top and 12 inches at spring line.
 5. For Pipe over 60 inches (I.D.): 36 inches at top and 12 inches at spring line.
- G. Dig bell or coupling holes after grading trench only as necessary to permit accurate work in making joints.
- H. Refill unauthorized excavation below specified grade with aggregate base material and compact to uniform density of 95%.
- I. When excavations are complete, request and receive inspection. Correct unauthorized excavation.
- J. For pipe 12 inches or greater in diameter, provide initial granular bedding at least 4 inches thick or 1/12 outside diameter of pipe whichever is greater. Place bedding material at uniform density with minimum compaction. Granular bedding for pipes less than 12 inches in diameter shall be 3" thick.
- K. Excavate for manholes, valves, inlets, catch basins and other accessories. Structures may be placed directly against excavated earth when excavated faces are firm and unyielding, and outside structure line. Over excavate unacceptable native material, backfill with aggregate base material and compact. Request and receive inspection of excavation prior to pouring concrete.
- L. Stockpile excavated soil for reuse where directed. Remove excess or unsuitable excavated soil from site.

3.5 DEWATERING

- A. Keep trenches dry. Provide necessary equipment including pumps, piping and temporary drains.
- B. Do not discharge drainage water lines into municipal sewers without municipal approval. Ensure water discharge does not contain silt held in suspension.
- C. Control grading in and adjacent to excavations to prevent water from running into excavated areas or onto adjacent properties or public thoroughfares.
- D. Furnish and operate suitable pumps on 24 hour basis to keep excavations free of water until after installing utility service and backfilling.

3.6 BACKFILLING UTILITY TRENCHES

- A. Do not start backfilling until services have been inspected and approved.

- B. Keep building debris and water out of trenches.
- C. Backfill systematically and as early as possible to allow maximum time for natural settlement and compaction.
- D. Place fill materials in accordance with governing utility company requirements. Use method which will not disturb or damage services.
- E. Maintain optimum moisture content of fill materials so as to attain required compaction density.
- F. From bottom of trench to 12 inches above top of pipe compact to minimum of 95% maximum dry density.
- G. From 12 inches above top of pipe to 24 inches below surface compact fill to minimum of 95% maximum dry density.
- H. Compact upper 24 inches to 100% maximum density for granular soils, 95% maximum density for nongranular soils except in areas where solid sodding or seeding is required. In those areas the top 6 inches shall be topsoil compacted to the density of adjacent soil.
- I. Remove surplus fill materials from site.
- J. Compact fill at trenches where footings occur to 95% maximum density.

3.7 EXCAVATION FOR PAVEMENT DRIVEWAYS, CURBS AND GUTTERS, SIDEWALKS, AND OTHER HARDSCAPE

- A. Remove debris and loose material.
- B. Excavate:
 - 1. Unstable material outside planned improvement or ditch slopes which constitutes potential slides.
 - 2. Material which has deposited on improvement site or in ditch.
 - 3. Material which has slipped out of embankments.
- C. Excavate material to grades indicated.
- D. No point on the completed slope shall vary from the designated plane by more than one inch as measured at right angles to the slope, except where otherwise indicated.
- E. Do not encroach on road bed or parking area.
- F. Round tops, toes and ends of excavation slopes.

3.8 COMPACTION, TOLERANCES

- A. Compact soils under improvements in accordance with Section 02210 - GRADING.
- B. Grading tolerances under improvements shall be in accordance with Section 02210 - GRADING.

3.9 SURPLUS AND UNSUITABLE MATERIALS

- A. Dispose of materials in accordance with regulatory requirements specified in Section 02110 - SITE PREPARATION.
- B. Quantities when shown or specified are approximate.

3.10 OBSERVATION AND TESTING OF WORK

- A. Conform to requirements specified in Section 02210 - GRADING
- B. One field density test for each 100 lineal ft. of trench backfill per lift shall be performed, unless directed otherwise.

END OF SECTION 02220

SECTION 02221

TRENCHING AND BACKFILLING

PART 1 GENERAL

1.1 WORK INCLUDED IN THIS SECTION

This section shall consist of excavation of trench, bedding of pipe and backfilling of trench.

1.2 RELATED WORK SPECIFIED ELSEWHERE

Not applicable.

1.3 QUALITY ASSURANCE

- A. Materials which have been rejected shall be removed from the job site.
- B. Bedding or backfill that do not conform to the specifications shall be removed or reworked until the specifications are met.

1.4 PROTECTION

- A. Existing Property - The contractor shall exercise reasonable care in excavating trenches for water lines or sewer force mains in order not to interfere with or damage existing improvements on public or private property. Any property damaged shall be replaced by the contractor at his own expense.
- B. Existing Utilities
 - 1. The contractor shall be responsible for determining the exact location of existing utilities within the work area.
 - 2. Any utility line that is cut must be reported to the Owner and repaired immediately in order to maintain service to the customers. These repairs are considered part of the pipe laying cost and will not be paid for separately.
 - 3. The contractor shall coordinate with the utility company and the Owner in the event that utilities must be shut off.

1.5 SITE CONDITIONS

- A. Excavations
 - 1. Trenches and other excavations more than five feet deep (or less when hazardous ground movement is expected) shall be shored, laid back to a stable slope or some other means of protection provided (such as trench

boxes) where employees may be exposed to moving ground or cave-ins.

2. Additional precaution (shoring or bracing) shall be installed when trenches are exposed to vibrations (railroad, highway or machinery) or adjacent to backfill. Cross braces or trench jacks shall be placed in true horizontal position, be spaced vertically and be secured.
 3. Trenches over five feet deep shall have ladders or stairs every 50 feet.
 4. In all events all excavations and trenches shall be in compliance with all codes and ordinances especially the OSHA "Construction Standards for Excavations" 29CFR Part 1926.650 through 1926.652 Subpart P.
- B. Dewatering - If dewatering is required, the contractor shall exercise care not to allow water to damage existing property or damage bedding.

PART 2 PRODUCTS

2.1 BEDDING

Pipe Bedding - Shall consist of pea gravel.

2.2 BACKFILL

- A. PIPE - Initial backfill material shall consist of pea gravel.
- B. Remaining backfill (called general backfill) shall be select material free of stones (maximum particle size of 6 inches). Stones or rock larger than 6 inches shall be removed from the work site.

PART 3 EXECUTION

3.1 TRENCH EXCAVATION

- A. Trenches shall be excavated to the depth specified. In the event rock is encountered in the excavation, the trench must be excavated to a depth not less than six (6) inches below grade and then filled back to grade with bedding material. There shall be no additional payment for the excavation of rock or the placing of the bedding in the bottom of the trench.
- B. Rock or other unsuitable material excavated which is not suitable for backfill shall be removed from the job site.
- C. Trench Width - Water mains shall be of sufficient width for the proper installation of the pipe. Maximum widths are as follows:

PIPE SIZE	TRENCH WIDTH (Maximum)
1" - 3"	18"

3.2 DEPTH OF TRENCH

Except when otherwise shown on the drawings, or herein specified, all pipe trenches shall be constructed to a minimum depth of 36 inches. Pipe shall be laid deeper whenever necessary in order to avoid obstructing other lines.

3.4 METHOD OF PAYMENT AND MEASUREMENT

- A. Trenching for pipes shall be subsidiary to the other items. Trenching will not be measured or paid for separately.
- B. Rock excavation shall be subsidiary to the trenching and shall be included in the lump sum price and will not be paid for separately.
- C. All items of work in this section shown on the plans or called for in the specifications which are not given in the list of variable quantities shall be included in the various unit contract prices of work.

END OF SECTION 02221

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SECTION 02232
SUBGRADE

PART 1 GENERAL

1.1 PROVISIONS

- A. Requirements of the General Provisions apply to all work under this section.
- B. Throughout the specifications, types of materials may be specified by manufacturer's name and catalogue number in order to establish standards of quality and performance and not for the purpose of limiting competition. Alternate methods and/or materials may be submitted to the Engineer for consideration. Those judged to be equal to that specified will receive written approval.

1.2 DESCRIPTION

This item shall consist of shaping, compacting and otherwise preparing the completed roadbed for the placing of base and surface courses and pavements in accordance with these specifications and in substantial conformity with the lines, grades, and cross sections shown on the Plans.

PART 2 PRODUCT (Not Applicable)

PART 3 EXECUTION

- 3.1** The subgrade shall be prepared in such manner as to insure that the base, surface course, or pavement will be placed on a firm foundation that is stable and reasonably free from dust pockets, wheel ruts and other defects.

The subgrade area shall be scarified as may be necessary for shaping, and shaped and compacted to the required grade and section. The top eight (8) inches of the subgrade shall be compacted to a density, as determined by AASHTO T 191, of not less than 95% of the maximum density obtained by AASHTO T 99. This compaction shall be accomplished by any satisfactory method or methods that will obtain the required density. The Contractor shall bring the moisture content of the material to be compacted to substantially that of optimum moisture by the addition of water or by manipulation and aeration as it may be necessary to increase or decrease the moisture content under the conditions encountered.

The density requirements specified above will not apply to subgrade for unbound granular type surface courses.

Compaction operations may be dispensed with when an old stone or gravel roadbed is used as a foundation or subgrade for a base course or pavement where scarifying for shaping is unnecessary and its stability is approved by the Engineer.

All soft and yielding material and other portions of the subgrade which will not compact readily when rolled or tamped shall be removed. Holes or depressions made by the

removal of unsuitable material as directed above shall be filled with an approved material and the whole subgrade brought to the lines, grade and cross section shown on the plans and compacted to the required density.

If the succeeding course is not placed immediately after the subgrade has been prepared and the subgrade becomes cut up, rough, or unstable, it shall again be shaped and recompactd in accordance with the above requirements.

END OF SECTION 02232

SECTION 02233
AGGREGATE BASE COURSE

PART 1 GENERAL

1.1 PROVISIONS

- A. Requirements of the General Provisions apply to all work under this Section.
- B. Throughout the specifications, types of materials may be specified by manufacturers name and catalogue number in order to establish standards of quality and performance and not for the purpose of limiting competition. Alternate methods and/or materials may be submitted to the Engineer for consideration. Those judged to be equal to that specified will receive written approval.

1.2 DESCRIPTION

This item shall consist of a foundation course for surface courses pavements. It shall be constructed on the prepared subgrade or other completed base course in accordance with these specifications, and in substantial conformity with the lines, grades, compacted thickness and typical cross section shown on the Plans.

PART 2 PRODUCTS

2.1 MATERIALS

This material shall consist of crusher run stone or a mixture of crushed stone and natural fines uniformly mixed and so proportioned as to meet all the requirements hereinafter specified, with further provisions that a mixture of crushed stone and natural fines shall contain not less than 90 per cent crusher produced material. The stone shall be hard and durable with a percent of wear by the Los Angeles Test (AASHO T 96) not greater than 45. For the purpose of this specification, shale and slate are not considered to be stone. The material furnished shall not contain more than 5% by weight of shale, slate, and other objectionable, deleterious, or injurious matter.

The class or classes of crushed stone base course material that may be used on any particular job will be those called for on the proposal schedule.

GRADING REQUIREMENTS

Size of Sieve Total Retained	Percent by Weight	
	Class SB-2	Class SB-3
1-1/2"	0	0
1"	0	0
3/4"	10-50	0-35
#4	45-75	45-75

Total Passing

#40	10-30	10-30
#200	3-10	3-10

The fraction passing the No. 200 sieve shall not be greater than two-thirds the fraction passing the No. 40 sieve. The fraction passing the No. 40 sieve shall have a liquid limit not greater than 25 and a plasticity index not greater than 6.

When it is necessary to blend two or more materials, each material shall be proportioned separately through mechanical feeders to insure uniform production. Premising or blending in the pit to avoid separate feeding will not be permitted.

The blending of materials on the roadway in order to obtain a mixture that will comply with the above requirements will not be permitted.

PART 3 EXECUTION

3.1 GENERAL

- 1.1 The base course material shall be placed on a completed and approved subgrade or existing base that has been bladed to substantially conform to the grade and cross section shown on the plans.
- 1.2 The subgrade shall be prepared as specified in Section 02232, and shall be free from an excess or deficiency of moisture at the time of placing the base course. The subgrade shall also comply, where applicable, with the requirements of other items that may be contained in the contract that provide for the construction or shaping of the subgrade or the reconstruction of the existing base course.
- 1.3 Base course material shall not be placed on a frozen subgrade or subbase.
- 1.4 The crushed stone shall be placed on the subgrade or other base course material and spread uniformly to such depth and lines that when compacted it will have the thickness, width and cross section shown on the plans.
- 1.5 If the required compacted depth of the base course exceeds 6 inches, the base shall be constructed in two or more layers of approximately equal thickness. The maximum compacted thickness of any one layer shall not exceed 6 inches. When vibrating or other approved types of special compacting equipment are used, the compacted depth of a single layer of the base course may be increased to 8 inches upon approval.
- 1.6 The spreading shall be done the same day that the material is hauled, and it shall be performed in such manner that no segregation of coarse and fine particles nor nests or hard areas caused by dumping the crushed stone on the subgrade will exist. To insure proper mixing, the crushed stone shall be bladed across the roadbed before being spread. Care must be taken to prevent mixing of subgrade or shoulder material with the base course material in the blading and spreading operation.
- 1.7 Each course shall be compacted by any satisfactory method that will obtain the density herein specified. The crushed stone shall be substantially maintained at

optimum moisture during the mixing, spreading, and compacting operations, water being added or the material aerated as may be necessary. The specified grade and section shall be maintained by blading throughout the compaction operation. The density of the compacted material in each course, as determined by AASHTO T 191, shall not be less than 100% of the density obtained in the laboratory. The crushed stone shall be compacted across the full width of application.

- 1.8 The laboratory density shall be obtained as follows: the sample is prepared by removing the aggregate passing the $\frac{3}{4}$ " inch sieve and retained on a #4 sieve in an amount equal to that removed. The sample so prepared is compacted at various water contents in five equal layers in a mould 6 inches in diameter and 7 inches high. Each layer is compacted by 55 blows of a 10 pound hammer 2 inches in diameter dropped at a height of 18 inches. The density used is the dry weight obtained at the optimum water content.
- 1.9 The compacted base course shall be tested for depth and any deficiencies corrected by scarifying, placing additional material, mixing, reshaping, and recompacting to the specified density, as directed.
- 1.10 Where neither prime coat, surfacing, nor pavement are provided in the same contract with the base course, the density requirement for the base course will be waived and no compaction will be required beyond that obtained by systematic maintenance under traffic.
- 1.11 The Contractor shall maintain the base course in a satisfactory condition until accepted.

END OF SECTION 02233

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SECTION 02273 - HAND PLACED RIPRAP

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Hand placed riprap at location shown on the Drawings.

1.02 RELATED SECTIONS

- A. Section 02920 – Lawns and Grasses

1.03 SUBMITTALS

- A. Submit samples of stone riprap and stone infill for approval by Architect/Engineer.

1.04 QUALITY ASSURANCE

- A. Architect/Engineer may require written certification that the stone meets the abrasion resistance requirements as determined by the Los Angeles Machine Test.

PART 2 - PRODUCTS

2.01 MATERIAL

- A. Riprap Stone: Hauled in stone riprap approved by Architect/Engineer.
 - 1. Resistant to action of air and water.
 - 2. Abrasion resistant: not greater than 45% of wear when tested by ASTM C535.
 - 3. Type: Grey granite riprap stone.
 - 4. Weight: Not less than 150 pounds per cubic foot.
 - 5. Size: At least 60 percent by weight shall weigh not less than 75 pounds each, with no dimension less than six inches and at least one dimension less than twelve inches.
- B. Infill stone: Round, unfractured stones sized from 1-inch to 2-inch in greatest dimension; color to blend with the riprap.
- C. Weed Barrier under riprap: Warren's WEED ARREST landscape fabric - 5.2 oz/S.Y., 90 mils thickness, or equal.
- D. Soil anti-germinate under weed barrier: EPTAM, or approved equal.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Shape surfaces to be protected as indicated on the Drawings.
- B. Prevent mixture of embankment or base soil with stone protection.
- C. A trench shall be excavated and shaped to extended fill slopes, if any, to such depth that the top of the riprap toe when placed will be at least 18 inches below the final ground surface.
- D. When rock or hard shale trench excavation is required, the riprap shall be keyed

- into this material the depth of the riprap.
- E. Treat the soil with anti-germinant in accordance with manufacturer's directions.
- F. Install weed barrier fabric, lapping edges minimum 6 inches.

3.02 RIPRAP INSTALLATION

- A. Place stones with close joints.
- B. Place stones in courses laid from the bottom of slopes upward, the largest stones being placed in lower courses.
- C. Fill open joints with infill stone from bottom to top and sweep surface with a stiff broom. Make sure underlying weed barrier fabric is not visible and leave tops of larger stones in top layer exposed.
- D. Maintain the riprap protection until accepted, replacing any material displaced.

END OF SECTION

SECTION 02285 - SOIL TREATMENT FOR SUBTERRANEAN TERMITE CONTROL

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 SUBMITTALS

Approval is required for submittals.

- A. Data
Manufacturer's label and Material Safety Data Sheet (MSDS) for pesticides proposed for use.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Pesticides shall be delivered to the project site in sealed and labeled containers in good condition as supplied by the manufacturer or formulator. Pesticides shall be stored, handled, and used in accordance with manufacturer's labels. Labels shall bear evidence of registration under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended.

1.4 SAFETY REQUIREMENTS

- A. The Contractor shall formulate, treat, and dispose of termiticides and their containers in accordance with label directions. Water for formulating shall only come from sites as designated, and filling hose shall be fitted with a backflow preventer meeting local plumbing codes or standards. Overflow shall be prevented during the filling operation. Pesticides and related materials shall be kept under lock and key when unattended. Proper protective clothing and equipment shall be worn and used during all phases of termiticide application.

1.5 WARRANTY

- A. The Contractor shall provide a 5-year written warranty against infestations or reinfestations by subterranean termites of the buildings or building additions constructed under this contract. Warranty shall include annual inspections of the building addition. If live subterranean termite infestation or subterranean termite damage is discovered during the warranty period, and the soil and building conditions have not been altered in the interim, the Contractor shall:
 - B. Re-treat the soil and perform other treatment as may be necessary for elimination of subterranean termite infestation;
 - C. Repair damage caused by termite infestation; and
 - D. Re-inspect the building approximately 180 days after the retreatment.

PART 2 - PRODUCTS

2.1 MATERIALS

Termiticides shall be currently registered by the EPA/Arkansas State Plant Board.

PART 3 - EXECUTION

3.1 VERIFICATION OF CONDITIONS

At the time of application, the soil moisture content shall be sufficiently low to allow uniform distribution of the treatment solution throughout the soil.

Applications shall not be made during or immediately following heavy rains or when conditions may cause runoff and create an environmental hazard.

3.2 APPLICATION

A. Treatment of New Structures

The Contractor shall establish complete and unbroken vertical and/or horizontal (as necessary) soil poison barriers between the soil and all portions of the intended structure which may allow termite access to wood and wood related products. Application shall not be made to areas intended for use as a plenum air space. Surface treatments shall not be made for areas to serve as crawl spaces. Termiticide shall be applied as a coarse spray and provide uniform distribution unto the soil surface. Treatment shall be applied prior to placement of a vapor barrier or waterproof membrane and at least 12 hours prior to concrete placement. Where treated soil or fill material is not to be covered with a vapor barrier or waterproof membrane, adequate precautions shall be taken to prevent its disturbance. Soil or fill material disturbed after treatment shall be re-treated as specified above before placement of slabs or other covering structures. Treatment of the soil on the exterior sides of foundation walls, grade beams, and similar structures shall be coordinated with final grading and planting operations so as to avoid disturbance of the treated barriers. Manufacturer's warnings and precautions shall be observed in the handling and use of such materials. Care shall be taken to prevent these chemicals from entering water supply systems, potable water supplies, or aquifers; and that they do not endanger plants or animals.

B. Treatment of Existing Structures

The Contractor shall establish complete and unbroken vertical and/or horizontal (as necessary) soil poison barriers between the soil and all portions of the structure which may allow access to wood and wood related products. This barrier may be established by rodding, trenching and/or injection as necessary. No pesticides shall be applied to the soil beneath a plenum air space or surface applied to crawl spaces. Chemicals shall not be applied until the location of heat or air conditioning ducts, vents, and water, sewer, and plumbing lines are known

and identified. Extreme caution shall be taken to avoid contamination of these structural elements and airways.

C. Rates and Methods of Application

Rates and methods of application shall be in accordance with the manufacturer's instructions on the pesticide label. Maximum application or dosage rates shall be used. If the pesticide contains less than the amount of active ingredient specified on the label, work shall be repeated with pesticides conforming to this specification.

3.3 DISPOSAL

The Contractor shall dispose of residual pesticides and containers off Government property in accordance with label instructions and EPA criteria.

END OF SECTION

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SECTION 02511

CONCRETE SIDEWALKS AND CURBS AND GUTTERS

PART 1 SCOPE

1.1 PROVISIONS

- A. Requirements of the General Provisions apply to all work under this section.
- B. Throughout the specifications, types of materials may be specified by manufacturer's name and catalogue number in order to establish standards of quality and performance and not for the purpose of limiting competition. Alternate methods and/or materials may be submitted to the Engineer for consideration. Those judged to be equal to that specified will receive written approval.

1.2 DESCRIPTION

This item shall consist of construction of all sidewalks, curbs and gutters as shown on the drawings.

1.3 RELATED WORK

The following items of related work are specified and included in other sections of these specifications:

- A. Section 02210 – GRADING
- B. Section 02220 - EXCAVATING, BACKFILLING, AND COMPACTION
- C. Section 02513 - PORTLAND CEMENT CONCRETE PAVING
- D. Section 033000 - CAST-IN PLACE CONCRETE

PART 2 PRODUCTS

2.1 CONCRETE

- A. Strength - Concrete shall have a minimum compressive strength of 3500 psi at 28 days. Maximum size of aggregate shall be 1-1/2 inches.
- B. Air Content - Mixtures may have air content by volume of concrete of 5 to 7 percent, based on measurements made immediately after discharge from the mixer.

2.2 CONCRETE PROTECTION MATERIALS

Concrete protection materials shall be a linseed oil mixture of equal parts, by volume, of linseed oil and either mineral spirits, naphtha, or turpentine. At the option of the contractor, commercially prepared linseed oil mixtures, formulated specifically for application to concrete to provide protection against the action of deicing chemicals may be used, except that emulsified mixtures are not acceptable.

2.3 JOINT FILLER STRIPS

- A. Contraction/Expansion Joint Filler.
- B. Joint filler shall be Omniseal as manufactured by Sonneborn or approved equal
- C. Expansion joint filler, premolded, shall conform to ASTM D 1751 or ASTM D 1752, ½ inch thick, unless otherwise indicated.

2.4 FORM WORK

Form work shall be designed and constructed to insure that the finished concrete will conform accurately to the indicated dimensions, lines, and elevations, and within the tolerances specified. Forms shall be of wood or steel, straight, of sufficient strength to resist springing during depositing and consolidating concrete. Wood forms shall be surfaced plank, 2-inch nominal thickness, straight and free from warp, twist, loose knots, splits or other defects. Wood forms shall have a nominal length of 10 feet. Radius bends may be formed with ¾-inch boards, laminated to the required thickness. Steel forms shall be channel-formed sections with a flat top surface and with welded braces at each end and at not less than two intermediate points. Ends of steel forms shall be interlocking and self-aligning. Steel forms shall include flexible forms for radius forming, corner forms, form spreaders, and fillers. Steel forms shall have a nominal length of 10 feet with a minimum of three welded stake pockets per form. Stake pins shall be solid steel rods with chamfered heads and pointed tips designed for use with steel forms.

A. Sidewalk Forms

Sidewalk forms shall be of a height equal to the full depth of the finished sidewalk.

B. Curb and Gutter Forms

Curb and gutter outside forms shall have a height equal to the full depth of the curb or gutter. The inside form of curb shall have batter as indicated and shall be securely fastened to and supported by the outside form. Rigid forms shall be provided for curb returns, except that benders or thin plank forms may be used for curb or curb returns with a radius of 10 feet or more, where grade changes occur in the return, or where the central angle is such that a rigid form with a central angle of 90 degrees cannot be used. Back forms for curb returns may be made of 1-1/2 inch benders, for the full height of the curb, cleated together.

2.5 REINFORCEMENT STEEL

Reinforcement steel shall be as specified in Section 02513 - PORTLAND CEMENT CONCRETE PAVING.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

The subgrade shall be constructed to the specified grade and cross section prior to concrete placement.

A. Sidewalk Subgrade

The subgrade shall be tested for grade and cross section with a template

extending the full width of the sidewalk and supported between side forms.

B. Curb and Gutter Subgrade

The subgrade shall be tested for grade and cross section by means of a template extending the full width of the curb and gutter. The subgrade shall be of materials equal in bearing quality to the subgrade under the adjacent pavement.

C. Maintenance of Subgrade

The subgrade shall be maintained in a smooth, compacted condition in conformity with the required section and established grade until the concrete is placed. The subgrade shall be in a moist condition when concrete is placed. The subgrade shall be prepared and protected so as to produce a subgrade free from frost when the concrete is deposited.

3.2 FORM SETTING AND REMOVAL

Forms shall be held rigidly in place by a minimum of three stakes per form placed at intervals not to exceed 4 feet. Corners, deep sections, and radius bends shall have additional stakes and braces, as required. Clamps, spreaders, and braces shall be used where required to insure rigidity in the forms. Forms shall be removed without injuring the concrete. Bars or heavy tools shall not be used against the concrete in removing the forms. Any concrete found defective after form removal shall be promptly and satisfactorily repaired. Forms shall be cleaned and coated with form oil each time before concrete is placed.

A. Sidewalks

Forms for sidewalks shall be set with the upper edge true to line and grade with an allowable tolerance of 1/8 inch in any 10-foot long section. After forms are set, grade and alignment shall be checked with a 10-foot straightedge. Forms shall have a transverse slope of 2% (maximum) with the low side adjacent to the roadway, unless otherwise shown on the drawings. Side forms shall not be removed for 24 hours after finishing has been completed.

B. Curbs and Gutters

The forms of the front of the curb shall be removed not less than 2 hours nor more than 6 hours after the concrete has been placed. Forms back of curb shall remain in place until the face and top of the curb have been finished as specified for concrete finishing. Gutter forms shall not be removed while the concrete is plastic enough to slump in any direction.

3.3 SIDEWALK CONCRETE PLACEMENT AND FINISHING

A. Reinforcement Steel Placement

Reinforcement steel shall be accurately and securely fastened in place with suitable supports and ties before the concrete is placed.

B. Formed Sidewalks

Concrete shall be placed in the forms in one layer of such thickness that when consolidated and finished the sidewalks will be of the thickness indicated. After concrete has been placed in the forms, a strike-off guided by side forms shall be

used to bring the surface to proper section to be compacted. The concrete shall be consolidated with an approved vibrator, and the surface shall be finished to grade with a wood float, bull float, or darby, edged and broom finished.

C. Concrete Finishing

After straightedging, when most of the water sheen has disappeared, and just before the concrete hardens, the surface shall be finished to a smooth and uniformly fine granular or sandy texture free of waves, irregularities, or tool marks. A scored surface shall be produced by brooming with a fiber-bristle brush in a direction transverse to that of the traffic.

D. Edge and Joint Finishing

All slab edges, including those at formed joints, shall be finished carefully with an edger having a radius of 1/8 inch. Transverse joints including those used for handicapped ramps shall be edged before brooming, and the brooming shall eliminate the flat surface left by the surface face of the edger. Corners and edges which have crumbled and areas which lack sufficient mortar for proper finishing shall be cleaned and filled solidly with a properly proportioned mortar mixture and then finished.

3.4 CURB AND GUTTER CONCRETE PLACEMENT AND FINISHING

A. Formed Curb and Gutter

Concrete shall be placed to the section required in a single lift. Consolidation shall be achieved by using approved mechanical vibrators.

B. Concrete Finishing

Exposed surfaces shall be floated and finished with a smooth wood float until true to grade and section and uniform in texture. Floated surfaces shall then be brushed with a fine-hair brush with longitudinal strokes.

The edges of the gutter and the base edge of the top of the curb shall be rounded with an edging tool to a radius of 1/2 inch. Immediately after removing the front curb form, the face of the curb shall be rubbed with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. The front curb surface, while still wet, shall be brushed in the same manner as the gutter and curb top. The top surface of gutter and entrance shall be finished to grade with a wood float.

C. Joint Finishing

Curb edges at formed joints shall be finished as indicated.

3.5 SIDEWALK JOINTS

Sidewalk joints shall be constructed to divide the surface into rectangular areas. Transverse contraction joints shall be spaced at a distance equal to the sidewalk width or 5 feet on centers, whichever is less, and shall be continuous across the slab. Longitudinal contraction joints shall be constructed along the centerline of all sidewalks

10 feet or more in width. Transverse expansion joints shall be installed at sidewalk returns and in line with expansion joints in adjoining curbs. Where the sidewalk is not in contact with the curb, transverse expansion joints shall be installed as indicated. Expansion joints shall be formed about structures and features which project through or into the sidewalk pavement, using joint filler of the type, thickness, and width indicated.

A. Contraction Joints

The contraction joints shall be formed in the fresh concrete by cutting a groove in the top portion of the slab to a depth of at least one-fourth of the sidewalk slab thickness, using a jointer to cut the groove, or by sawing a groove in the hardened concrete with a power-driven saw, unless otherwise approved. Sawed joints shall be constructed by sawing a groove in the concrete with a 1/8-inch blade to the depth indicated. An ample supply of saw blades shall be available on the job before concrete placement is started, and at least one standby sawing unit in good working order shall be available at the jobsite at all times during the sawing operations.

B. Expansion Joints

Expansion joints shall be formed with 3/8-inch joint filler strips. Joint filler shall be placed with top edge 1/4 inch below the surface and shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing. Immediately after finishing operations are completed, joint edges shall be rounded with an edging tool having a radius of 1/8 inch, and concrete over the joint filler shall be removed. At the end of the curing period, expansion joints shall be carefully cleaned and filled with joint sealer. Concrete at the joint shall be surface dry and the atmospheric and pavement temperatures shall be above 50 degrees F at the time of application of joint-sealing materials. Joints shall be filled with sealer flush with the concrete surface in such manner as to avoid spilling or smearing onto the walk surface.

3.6 CURB AND GUTTER JOINTS

Curb and gutter joints shall be constructed at right angles to the line of curb and gutter.

A. Contraction Joints

Contraction joints shall be constructed in line with contraction joints in abutting Portland cement concrete pavements and spaced so that monolithic sections between curb returns will not be less than 5 feet nor greater than 15 feet in length. Contraction joints shall be constructed by means of 1/8-inch thick separators and of a section conforming to the cross section of the curb and gutter. Separators shall be removed as soon as practicable after concrete has set sufficiently to preserve the width and shape of the joint and prior to finishing.

B. Expansion Joints

Expansion joints shall be formed by means of preformed expansion joint filler material cut and shaped to the cross section of curb and gutter. Expansion joints shall be provided in curb and gutter in line with expansion joints of abutting Portland cement concrete pavement, and shall be of the same type and

thickness as joints in the pavement. Where curb and gutter do not abut Portland cement concrete pavement, expansion joints at least 3/8 inch in width shall be provided at intervals not exceeding 30 feet. Expansion joints shall be provided in nonreinforced concrete gutter at locations indicated.

END OF SECTION 02511

SECTION 02622

PVC PRESSURE PIPE AND FITTINGS

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

This section shall include the furnishing and installation of PVC pressure pipe.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Trenching and backfilling: Section 02223

1.3 QUALITY ASSURANCE

- A. The pipe manufacturer shall be a member of the Plastic Pipe and Fittings Association or Uni-Bell PVC Pipe Association and shall have manufactured the pipe and/or joint proposed for use for not less than five (5) years.
- B. The pipe shall be permanently marked by the manufacturer and coded for the date, batch and shift in which the pipe was made along with other required marking as set forth in ASTM or AWWA Standard Specifications. The pipe shall also bear the NSF seal.
- C. The supplier shall furnish to the contractor a warranty governing both workmanship and material and shall be for a period of not less than one (1) year from date of acceptance by the Owner or his agent. The warranty of the material by the supplier shall be in writing to the contractor. Any material failure shall be replaced at no cost to the Owner.
- D. All PVC water pipe shall be by the same manufacturer, unless otherwise approved by the Engineer.

PART 2 - PRODUCTS

2.1 PVC PRESSURE PIPE

- A. General - The pipe and fittings shall be manufactured from NSF approved Type I, Grade I PVC, which is Class 12454-B rigid PVC compound, conforming to ASTM Resin Specifications D-1784 as amended and/or revised and shall be stamped with the NSF seal of approval and permanently marked.

- B. Provisions shall be made^e for expansion and contraction at each joint by use of a gasket type joint and integral bell, or equal.
- C. Size Four Inch and Larger - The pipe shall have a minimum pressure rating of 200 psi at 73.4° F and conform to the requirements of specifications ASTM D-2241-69, and Product Standards PS 22-70 as amended and/or revised, and with standard dimension ratio (SDR) of 21. Pipe with a pressure rating of 250 psi (SDR-17) or 315 psi (SDR-13.5) shall be installed at locations required by the plans. Also where called for by the plans, pipe meeting the requirements of AWWA C-900 Class 200, Class 150, Class 100 shall be installed.
- D. Size Three-Inch and Smaller - The pipe shall have a minimum pressure rating of not less than 200 psi at 73.4° F and conform to the requirements of Specifications ASTM D-2241-69 and Product Standard PS 22-70 and with standard dimensions ratio (SDR) of 21. Pipe with a pressure rating of 250 psi (SDR-17) or 315 psi (SDR-13.5) shall be installed at locations required by the plans.

2.2 FITTINGS

- A. Size Four Inch and Larger - All fittings and specials used in connection with pipe four-inch and larger shall conform to AWWA short or long bodied cast or ductile iron fittings using a mechanical joint system with hardened or duct tipped type of rubber gaskets in accordance with AWWA Specifications C-110 and C-111. The fittings shall be cement lined in accordance with AWWA Specification C-104. The pipe and fittings shall be installed in accordance with the recommendations of the pipe manufacturer and the Engineer or his representative.
- B. Size Three-Inch and Smaller - All fittings and specials used in connection with pipe three-inch and smaller shall be rated at least equal to pressure class rating of the pipe and conform to recommendations by the pipe manufacturer or be of proven pipe. The pipe and fittings shall be installed in accordance with the recommendations of the pipe manufacturer and as directed by the Engineer. No PVC male adapters will be allowed.

2.3 LUBRICANTS

The joint lubricant shall be nontoxic, shall not support the growth of *bacteria* and shall have no deteriorating effects on the gasket and pipe materials. The

lubricants shall comply with NSF Standards 14 and 61, ASTM D 3139 and shall not impart taste or odor to water in a pipe that has been flushed in accordance with AWWA C601-68.

PART 3 - EXECUTION

3.1 HANDLING AND LAYING PVC PLASTIC PIPE AND FITTINGS

Remove any dirt or foreign material from groove so that ring will set completely in the ring groove. The ring shall be faced in the prOPer direction with color marking faced out. Smooth ring so that it sets evenly all around in the groove free from any twists. Ring insertion on small pipe can be made easier by dipping ring in plain water (do not use lubricant on ring). Clean the entire circumference of the spigot end of the pipe and apply lubricant of the type recommended by the pipe manufacturer. The lubricant shall be applied from a point one inch back from the beveled end of the pipe with pad, sponge, or cloth. The thickness of the applied coat or lubricant shall be constant with a brush coat of enamel paint.

The bell of the pipe shall be held firmly in place to prevent the joints already assembled in the line from closing up. Insert the spigot end of the pipe in line with the bell and as straight as possible and shove in place to the preset reference mark. Assembly shall be made with the pipe as close to the ground as possible. The use of metal chains, cables, etc., for assembly will not be permitted. Any undue resistance during assembly indicates the ring may have become twisted and the joint shall be pulled apart and reassembled.

If it becomes necessary to cut pipe, a tubing cutter or carpenter's saw shall be used and cut shall be made perpendicular to the centerline of the pipe. Remove burrs from inside of wall by means of a knife or fine sandpaper. After cutting pipe and before jointing, the end shall be beveled to conform as near as possible to a factory bevel using a milled curved tooth flat file so as to get a smooth surface. No threading of pipe will be allowed. Use a pencil or crayon to make new reference mark using a factory mark as a pattern.

Minimum curves of pipe shall not be less than that recommended by the pipe manufacturer.

3.2 SETTING FITTINGS

Cast Iron and ductile iron fittings shall be set in the line as the work progresses and shall be connected to the water line as specified. Plugged fittings shall be carefully laid and properly blocked to avoid leakage. Where small service mains are to be connected at specials, the contractor shall use tapped plugs.

3.3 TESTING

- A. General - After the water mains have been laid as specified, the entire system shall be given a hydrostatic pressure test and a leakage test. This may be done by sections between valves as selected by the Engineer for convenience.

These tests shall be performed by the contractor in the presence of the Engineer. The contractor shall furnish all necessary pressure gauges, meters, and pumps, and make all taps and connections.

- B. Hydrostatic Test - The section to be tested shall be slowly filled with water and all air expelled. Pressure shall be applied by means of a pressure pump and maintained for at least two hours or until the whole section can be examined. The test shall be at 50% above normal operating pressure for the area, not to exceed the class rated pressure of the pipe; however, in no case shall the testing pressure be lower than 100 psi on any portion of the line being tested. All leaks and defects found during the test shall be satisfactorily repaired and corrected by the contractor.
- C. Leakage Test - The contractor will make a leakage test, and the test shall be at the same pressure conditions as specified for the hydrostatic test. Each leakage test shall be of two hours duration or longer, if necessary, to satisfy the Engineer that leakage in the line meets the .

Allowable leakage (in GPH) is given by the formula:

$$L = (N D^{1/2}) / 7400$$

N = Number of Joints

D = Nominal diameter of pipe inches

P = Average test pressure in psi

If the leakage in the test section does not meet the specifications, the contractor shall locate and repair the leaks and retest the line. The cost of this work shall be included in the unit price for laying pipe and will not be paid for separately.

3.4 STERILIZATION

All mains shall be thoroughly flushed until all foreign material -and colored water is expelled before sterilization.

Before the mains are placed in service, they shall be Sterilized with chlorine. Either liquid chlorine or hypochlorite may be used in such amount as to provide a dosage of chlorine not less than 50 ppm. The sterilizing agent may be introduced in any manner, approved by the Engineer that will insure a

uniform distribution.

Following a contact period of not less than 24 hours, the chlorine shall have a residual of not less than 25 ppm. The chlorinated water shall then be flushed from the line or structures and samples taken and analyzed for bacterial purity. This process shall be continued until samples indicate that the water is safe for human consumption as determined by the Arkansas Health Department. All valves in water lines being sterilized shall be opened and closed several times during the test period. Two consecutive daily samples are presently required by the Health Department for approval.

The contractor shall provide samples as directed by the Engineer for bacterial analysis and approval by the Arkansas Health Department. The cost of this work shall be included in the unit price for laying pipe and will not be paid for separately.

3.5 CONTRACTOR'S SUPPLIER LIST

At the time of the pre-construction conference, the contractor shall present to the Engineer and Owner a complete listing (by manufacturer) of all materials to be used on the project. If required to do so, he will also furnish submittal information and other material needed to determine if the proposed material will meet these specifications.

END OF SECTION

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SECTION 02669 POTABLE WATER SYSTEM

PART 1 GENERAL

1.1 PROVISIONS

- I. Throughout the specifications, manufacturer's name and catalogue number may specify types of materials in order to establish standards of quality and performance and not for the purpose of limiting competition. Alternate methods and/or materials may be submitted to the Engineer for consideration. Those judged to be equal to that specified will receive written approval.

1.2 DESCRIPTION

- A. Work covered by this Section includes furnishing of and paying for all materials, labor, services, equipment, licenses, taxes, other items, and appliances necessary for the execution, installation and completion of all work specified herein and/or shown on the drawing.
- B. The Work described in this section of the specifications includes, but is not limited to the following:
 1. Water line construction with necessary water main materials, fittings, connections and accessories.

1.3 RELATED WORK

The following items of related work are specified and included in other sections of these specifications:

1. Section 02220 - Excavating, Backfilling and Compacting.

1.4 CONSTRUCTION SCHEDULING AND COORDINATION

Service to water customers shall not be disrupted during installation of the water line improvements except for the time required to change individual services as specified herein.

The Contractor shall notify the City of Paragould Utility Department at least 48 hours prior to scheduled connections of mains. Scheduling shall be subject to the approval of the Utility Department and the Engineer.

The work of this Section shall be coordinated with the work of other Sections. The Contractor shall make field measurements at the site to verify or supplement indicated dimensions and to ensure proper coordination of all construction items.

The sequence of construction and change over shall be as follows:

- A. Install new mains as shown on the plans, including fire hydrants in accordance with the specification shown in the plan.

- B. Test, disinfect and sample mains as specified. After samples are approved, place mains in service.
- C. Install new services, including saddles, and transfer customer's services to the new main.
- D. On lines to be abandoned, close existing valves and cut and plug line; remove existing valve box and fire hydrants.

PART 2 PRODUCTS

2.1 PVC PIPE

- A. All Polyvinyl chloride (PVC) pressure pipe shall conform to AWWA C 900 made from class 12454 - A or 12454-B material as defined by ASTM D1784 with classification specified in the drawing. PVC pipe shall have a minimum pressure class rating of 150 psi.

2.2 GATE VALVES AND BOXES

- A. Gate valves 3" and smaller shall be iron body, bronze mounted, resilient seat or double disc, parallel seat "O" ring. Gate valves may be either mechanical or slip joint rubber gasket joint. Gate valves shall be Mueller or American Flow Control AWWA Standard or equal. All valves must operate to close in the same direction as described in "C" below.
- B. Gate valves 4" and larger shall be resilient seat type iron body with modified wedge disc. Valve interior shall have an iron body with modified wedge disc. Valve interior shall have an epoxy coating. Gate valve may be either mechanical or slip joint rubber gasket joint. Gate valves shall be Mueller resilient seat gate valve or equal.
- C. All gate valves shall be non-rising stem type with 2" square operating nuts. Gate valves shall open to the left (counterclockwise) and shall be 200 psi design. One operating wrench shall be provided to the Owner. All gate valves by one manufacturer.
- D. Valve boxes shall consist of cast iron base and top section with cover which shall be marked "Water." The top section shall be adjustable for elevations and shall be set to allow equal movement above and below finished grade. The base shall be centered over the valve and below finished grade. The base shall be centered over the valve and shall rest on compacted backfill. The top of the base section shall be approximately on line with nut at top of valve stem, and the entire assembly shall be plumb. The boxes shall be two-piece screw type, Tyler #142-Q on 2" and 3" valves, #562-S on 4" and 6" valves, and #461-S on 8" through 12" valves, or approved equal. Valve boxes shall be made by an American manufacturer.

2.3 CORPORATION COCKS

Shall be suitable for use with plastic or copper water service and shall be similar or equal to Type F1000 as manufactured by Ford Meter Box Company, or H-15008 as manufactured by Mueller Corporation. All 'brass' service line fittings shall be of red brass containing 85% copper and 5% each of tin, lead, and zinc in accordance with ASTM B-62. Upon request by the Owner, the supplier shall certify in writing to the Engineer that the fittings supplied

meet the above specifications and those of AWWA C-800. All corporation cocks shall be designed to withstand working pressures of up to 250 psi.

2.4 MASTER METER VAULT

- A. Concrete Vault - To be constructed by the contractor as per Drawings.

2.5 MASTER WATER METERS

- A. The Contractor will coordinate with the City utility company and pay for the installation of water meter assembly as per City standards and specifications.

2.6 FIRE HYDRANTS

Three-way hydrants shall be 5-1/4" safety break flange design equal to Mueller Centurion Catalog No. A-423. Leads shall be of the same material as the mains. One safety flange repair kit (Mueller A-301) shall be furnished to the Owner.

2.7 TAPPING SLEEVES AND VALVES

The tapping sleeve shall be either of the following types acceptable to Utility Company:

- A. Cast Iron - Tapping sleeves shall be of cast iron material with mechanical joint type seals and shall be of split gland type designed for 150 psi working main pressure. The sleeves shall have a Class 125 outlet flange and be similar and equal to Mueller H-615.
- B. Stainless Steel - Tapping sleeves shall be of stainless steel material of the split gland type designed for 150 psi working main pressure. The sleeve shall be similar and equal to Ford "SST."
- C. Carbon Steel - Tapping sleeves shall be of ASTM 285 Grade C carbon steel with corrosion resistant bolts. The body of the fitting shall be coated with a fusion applied epoxy coating. The sleeve shall be similar and equal to JCM 412.

The tapping valve shall have a Class 125 inlet flange, be rated for 150 psi working pressure, and have a mechanical joint outlet. The valve shall be a gate valve meeting latest revision of AWWA Standard C500.

2.8 LOCATOR TAPE

3" wide MAGNA - TEC or approved equal

PART 3 EXECUTION

3.1 LAYING OF WATER PIPE AND FITTINGS

- A. Pipe and accessories shall be handled in such a manner as to insure delivery on the work in sound, undamaged condition. Particular care shall be taken not to injure the pipe coating. Cutting the pipe for closure pieces or for other reasons shall be done by means of mechanical cutters of an approved type. Wheeled cutters shall be used where practicable.

- B. Before lowering into trench, and while suspended, the pipe shall be inspected for defects and cracks. Any defective, damaged, or unsound pipe shall be rejected. Deflections from a straight line or grade, made necessary by vertical or horizontal curves or offsets, shall not exceed the maximum recommended by the pipe manufacturer. Where these maximum deficiencies would otherwise be exceeded, the contractor shall provide special bends as approved by the Engineer, or a sufficient number of shorter lengths of pipe to provide angular deflections within the limits set out above. Except where otherwise necessary, pipe shall be laid with the bells facing in the direction of laying.
- C. All fittings at bends in the pipe shall be firmly wedged against the vertical face of the trench, or have suitable thrust backing as required by the Engineer. Reaction of thrust bearing shall be of concrete, placed between solid ground and the fitting.

3.2 TESTING

- A. General - After the water mains have been laid as specified, the entire system shall be given a hydrostatic pressure test and a leakage test. This may be done by sections between valves as selected by the Engineer for convenience. These tests shall be performed by the contractor in the presence of the Engineer. The contractor shall furnish all necessary pressure gauges, meters, and pumps, and make all taps and connections.
- B. Hydrostatic Test - The section to be tested shall be slowly filled with water and all air expelled. Pressure shall be applied by means of a pressure pump and maintained for at least two hours or until the whole section can be examined. The test shall be at 50% above normal operating pressure for the area, not to exceed the class rated pressure of the pipe; however, in no case shall the testing pressure be lower than 100 psi on any portion of the line being tested. All leaks and defects found during the test shall be satisfactorily repaired and corrected by the contractor. The contractor shall provide the water for testing.
- C. Leakage Test - The contractor will make a leakage test, and the test shall be at the same pressure conditions as specified for the hydrostatic test. Each leakage test shall be of two hours duration or longer, if necessary, to satisfy the Engineer that leakage in the line meets the specifications.

Allowable leakage (in GPH) is given by the formula:

$$W_{\text{Le}} = \frac{N D \sqrt{P}}{7,400}$$

re:

N = Number of Joints

D = Nominal diameter of pipe in inches

P = Average test pressure in psi

If the leakage in the test section does not meet the specifications, the contractor shall

locate and repair the leaks and retest the line. The cost of this work shall be included in the unit price for laying pipe and will not be paid for separately.

3.3 STERILIZATION

All mains shall be thoroughly flushed until all foreign material and colored water is expelled before sterilization.

Before the mains are placed in service, they shall be sterilized with chlorine. Either liquid chlorine or hypochlorite may be used in such amount as to provide a dosage of chlorine not less than 50 ppm. The sterilizing agent may be introduced in any manner, approved by the Engineer, that will insure a uniform distribution. Following a contact period of not less than 24 hours, the chlorine shall have a residual of not less than 25 ppm. The chlorinated water shall then be flushed from the line or structures and samples taken and analyzed for bacterial purity. This process shall be continued until samples indicate that the water is safe for human consumption as determined by the Arkansas Health Department. All valves in water lines being sterilized shall be opened and closed several times during the test period. Two consecutive daily samples are presently required by the Health Department for approval.

The contractor shall provide samples as directed by the Engineer for bacterial analysis and approval by the Arkansas Health Department. The cost of this work shall be included in the unit price for laying pipe and will not be paid for separately.

3.4 SETTING VALVES

Valves shall be placed in the line at points designated on the drawings. Valves shall be placed with the stem vertical. Valve boxes shall be placed with the top of the finished grade of the street.

3.5 INSTALLATION OF SERVICE CONNECTION

Service connection shall be made in accordance with details shown on the plans. The service line shall be laid perpendicular to the main line where possible. The contractor is responsible to connect the building shown on the drawings to the main water main. This task shall only take place after, testing and sterilizing of the main and service lines.

3.6 SETTING FIRE HYDRANTS

All fire hydrants shall have a minimum bury of 3 feet, and shall be installed as shown on the plans.

END OF SECTION

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SECTION 02720

STORM DRAINAGE SYSTEM

PART 1 GENERAL

1. PROVISIONS

Throughout the specifications, types of materials may be specified by manufacturer's name and catalogue number in order to establish standards of quality and performance and not for the purpose of limiting competition. Alternate methods and/or materials may be submitted to the Engineer for consideration. Those judged to be equal to that specified will receive written approval.

DESCRIPTIONS

- A. Work covered by this Section includes furnishing of and paying for all materials, labor, services, equipment licenses, taxes, other items, and appliances necessary for the execution, installation and completion of all work specified herein and/or shown on the drawing.
- B. The work described in this section of the specifications includes, but is not limited to, the following:
 - 1. Trench excavation, backfilling and compaction.
 - 2. Construction of storm drainage system.

1.3 RELATED WORK

- A. The following items of related work are specified and included in other sections of these specifications:
 - 1. Section 02210 - GRADING
 - 2. Section 02220 - EXCAVATING, BACKFILLING AND COMPACTING.
 - 3. Section 02722 - PVC CORRUGATED PIPE
 - 4. Section 033000 - CAST-IN-PLACE CONCRETE.

PART 2 PRODUCTS

2.1 PIPE FOR CULVERTS AND STORM DRAINS

Pipe for culverts and storm drains shall be of the sizes & types indicated and shall conform to the requirements specified in the Plans & Specifications.

PART 3 EXECUTION

3.1 EXCAVATION FOR PIPE CULVERTS, STORM DRAINS, AND DRAINAGE STRUCTURES

Excavation of trenches and for appurtenances and backfilling for culverts and storm drains shall be in accordance with the applicable portions of Section 02220 EXCAVATING, BACKFILLING AND COMPACTING.

- A. Trenching

The width of trenches at any point below the top of the pipe shall not be greater than the outside diameter of the pipe plus the widths listed in Section 02220 - EXCAVATING, BACKFILLING, AND COMPACTING to permit satisfactory jointing and thorough tamping of the bedding material under and around the pipe. Sheeting and bracing where required shall be placed within the trench width as specified. Care shall be taken not to over excavate.

B. Removal of Unstable Material

Where wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the Contracting Officer, is unexpectedly encountered in the bottom of a trench, such material shall be removed to the depth required and replaced to the proper grade with select granular material, compacted as provided in paragraph BACKFILLING. When removal of unstable material is due to the fault or neglect of the Contractor in his performance of shoring and sheeting, water removal, or other specified requirements, such removal and replacement shall be performed at no additional cost to the owner.

3.2 BEDDING

The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe. When no bedding class is specified or detailed on the drawings, concrete pipe shall be bedded carefully in a soil foundation accurately shaped and rounded to conform to the lowest one-fourth of the outside portion of circular pipe or to the lower curved portion of pipe arch for the entire length of the pipe or pipe arch. When necessary, the bedding shall be tamped. Bell holes and depressions for joints shall be only of such length, depth, and width as required for properly making the particular type of joint.

3.3 PLACING PIPE

PVC Pipe- See Section 02722 - PVC CORRUGATED PIPE

Concrete Pipe

Each pipe shall be carefully examined before being laid, and defective or damaged pipe shall not be used. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Under no circumstances shall pipe be laid in water, and no pipe shall be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary. Laying shall proceed upgrade with spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow. All pipe in place shall be inspected before backfilling, and those pipes damaged during placement shall be removed and replaced.

3.4 JOINTS

A. PVC Pipe: See Section 02722- PVC CORRUGATED PIPE

B. Concrete Pipe - Cement-mortar Bell-and-spigot Joint

The first pipe shall be bedded to the established gradeline, with the bell end placed upstream. The interior surface of the bell shall be carefully cleaned with a

wet brush and the lower portion of the bell filled with mortar to such depth as to bring inner surfaces of abutting pipes flush and even. The spigot end of each

subsequent pipe shall be cleaned with a wet brush and uniformly matched into a bell so that sections are closely fitted. After each section is laid, the remainder of the joint shall be filled with mortar, and a bead shall be formed around the outside of the joint with sufficient additional mortar. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint shall be wrapped with cheesecloth to hold mortar in place.

3.5 DRAINAGE STRUCTURES

A. Manholes, junction boxes and Inlets

Construction shall be of cast-in-place reinforced concrete, or precast reinforced concrete, complete with frames and covers or gratings and with fixed galvanized steel ladders where indicated.

B. Yard Drains shall be of the sizes & types indicated and shall conform to the requirements specified in the Plans & Specifications.

C. Walls and Headwalls

Construction shall be of reinforced concrete as indicated in drawings.

3.6 BACKFILLING

A. Backfilling Pipe in Trenches

After the pipe has been properly bedded, selected material from excavation or borrow, at a moisture content that will facilitate compaction, shall be placed along both sides of pipe in layers not exceeding 6 inches in compacted depth. The backfill shall be brought up evenly on both sides of pipe for the full length of back joint of pipe. Care shall be taken to insure thorough compaction of the fill under the haunches of the pipe. Each layer shall be thoroughly compacted with mechanical tampers or rammers. This method of filling and compacting shall continue until the fill has reached an elevation of at least 12 inches above the top of the pipe. The remainder of the trench shall be backfilled and compacted by spreading and rolling or compacted by mechanical rammers or tampers in layers not exceeding six (6) inches. Tests for density will be made as necessary to insure conformance to the compaction requirements specified elsewhere in this paragraph.

B. Backfilling Pipe in Fill Sections

For pipe placed in fill sections, backfill material and the placement and compaction procedures shall be as specified above. The fill material shall be uniformly spread in layers longitudinally on both sides of the pipe, not exceeding 6 inches in compacted depth, and shall be compacted by rolling parallel with pipe or by mechanical tamping or ramming. Prior to commencing normal filling operations, the crown width of the fill at a height of 12 inches above the top of the pipe shall extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 12 feet, whichever is less. After the backfill has reached at least 12 inches above the top of the pipe, the remainder of the fill shall be placed and thoroughly compacted in layers not exceeding six (6) inches.

C. Compaction

1. General

Cohesionless materials include gravels, gravel-sand mixtures, sands, gravelly sands, and very fine sands. Cohesive materials include clayey and silty gravels, gravel-silt mixtures, clayey and silty sands, sand-clay mixtures, clays and silts. When results of compaction tests for moisture-density relations are recorded on graphs, cohesionless soils will show straight lines or reverse-shaped moisture-density curves, and cohesive soils will show normal moisture-density curves.

2. Minimum Density

Backfill over and around the pipe and backfill around and adjacent to drainage structures shall be compacted at the approved moisture content to the following applicable minimum density (densities) which will be determined as specified in this paragraph.

- a. Under paved roads, streets, parking areas, curb and gutter, driveways, and sidewalks, the density shall be not less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material, up to the elevation where requirements for pavement subgrade materials and compaction shall control.
- b. Under unpaved or turfed areas, density shall not be less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material to within 6" of the surface. The top 6 inches shall be topsoil compacted to the density of the surrounding material. Disturbed areas shall be solid sodded after placement of topsoil.

END OF SECTION 02720

SECTION 02722

PVC CORRUGATED PIPE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 DESCRIPTION

This Item shall govern for the furnishing and installing of all Smooth Interior Corrugated PVC Pipe and/or materials for constructing corrugated pipe culverts or corrugated sewer mains, laterals, stubs and inlet leads. The pipes shall be of the sizes, types, design and dimensions shown on the plans and shall include all connections and joints to new or existing pipes, sewer, manholes, inlets, headwalls and other appurtenances as may be required to complete the work.

PART 2 PRODUCTS

2.1 MATERIALS

Unless otherwise specified on the plans or herein, all smooth interior corrugated PVC pipe shall be A-2000 as manufactured by CONTECH Construction Products Inc., or approved equal.

- A. PVC Compound: Pipe and fittings shall be made of PVC compound having a minimum cell classification of 12454 in accordance with ASTM D1784.
- B. Elastomeric Gaskets: Gaskets shall meet the requirements ASTM F477 and be suitable for the service intended.
- C. Pipe: Pipe shall be manufactured as a single extrusion of the smooth inner and the corrugated outer walls. The corrugated exterior profile shall be annular and seamless.
- D. Joints: All pipe joints are of the bell/spigot type and will be field connected. The joint shall utilize elastomeric sealing gasket with a double sealing surface design. The watertight joint shall meet the requirements of ASTM D3212.
- E. Fittings: Couplings, elbows reducers, tees, wyes, laterals and other fittings shall be capable of withstanding all operating conditions when installed. They may be molded or fabricated.
- F. Diameters: The inside and outside diameters of the pipe barrel 4"-36" nominal diameters shall be in accordance with ASTM F949 when measured in accordance with ASTM D2122.
- G. Lengths: Pipe shall be supplied in standard lengths of 12.5, 13 or 20 feet.
- H. Wall Thickness: The minimum wall thickness shall be as stated in Table 1 of ASTM F949 when measured in accordance with ASTM D2122.
- I. Sockets: All socket (bell) dimensions on pipe and fittings shall meet the requirements given in Table 2 of ASTM F949 when measured in accordance with ASTM D2122.

2.2 TESTING

- A. Pipes: Pipes shall be manufactured and tested in accordance with ASTM F949.
- B. Joints: Joints shall remain watertight when tested in accordance with ASTM D3212.
- C. Stiffness: The minimum pipe stiffness shall be 46 psi when tested in accordance with ASTM D2412.

2.3 INSPECTION

All delivered pipe shall be inspected. Damaged pipe will not be accepted.

2.4 INSTALLATION

Installation shall be in accordance with ASTM D2321 except that the minimum cover shall be 12" or as directed by the Engineer/Architect. Backfill shall be as shown in the construction plans, or as directed by the Engineer/Architect. Minimum trench width shall as shown in the construction plans or as designated by the Engineer/Architect. Backfill shall be placed in 8" loose lifts and compacted to a minimum of 95% standard proctor density or as designated by the Engineer/Architect.

2.5 METHODS

The location of private driveway and side road pipe shall be constructed at locations shown on the plans or as directed by the Engineer/Architect.

Smooth Interior Corrugated PVC Pipe shall be installed in accordance with the plans and requirements herein.

A. Excavation.

All excavation shall be in accordance with the requirements of Item 400, "Excavation and Backfill for Structures", except where tunneling or jacking methods are shown on the plans or permitted by the Engineer/Architect.

B. Shaping and Bedding.

All shaping and bedding shall be in accordance with Section 131, "Select Fill/Sand," and Item 400, "Excavation and Backfill for Structures".

C. Laying Pipe.

Unless otherwise authorized by the Engineer/Architect, the laying of pipes on the bedding shall be started at the outlet end, the separate sections firmly joined together, outside laps of annular joints pointing upstream and longitudinal laps on the sides. Proper facilities shall be provided for hoisting and lowering the sections of pipe into the trench without damaging the pipe or disturbing the bedding and the sides of the trench. Any pipe which is not in alignment or which shows any undue settlement after laying shall be taken up and re-laid without extra compensation.

D. Culvert Connections.

Where new structures are constructed as extensions to structures in place or are joined to existing structures, the construction shall include all work necessary to provide a proper connection between the new structure and the existing structure as indicated on the plans.

E. Reuse of Existing Appurtenances.

When existing appurtenances are specified on the plans for reuse, the portion to be reused shall be severed from the existing culvert and moved to the new position previously prepared, by approved methods.

Connections shall conform to the requirements for joining sections of pipes as indicated herein or as shown on the plans. Any headwalls and any aprons or pipe attached to the headwall that are damaged during moving operations shall be restored to their original condition at the CONTRACTOR's expense. The CONTRACTOR, if he so desires, may remove and dispose of the existing headwalls and aprons and construct new headwalls at

his own expense, in accordance with the pertinent specifications and design indicated on the plans or as furnished by the Engineer/Architect.

F. Sewer Connections and Stub Ends.

Connections of pipe sewer to existing sewers or sewer appurtenances shall be as shown on the plans or as directed by the Engineer/Architect. The bottom of the existing

structure shall be mortared or concreted if necessary, to eliminate any drainage pockets created by the new connection. Where the sewer is connected into existing structures which are to remain in service, any damage to the existing structure resulting from making the connection shall be restored by the CONTRACTOR to the satisfaction of the Engineer/Architect. Stub ends, for connections to future work not shown on the plans, shall be sealed by installing watertight plugs into the free end of the pipe.

G. Backfilling.

Backfilling for the sewer pipe structure is a critical phase of the construction and shall be in accordance with Item 400, "Excavation and Backfill for Structures". Special emphasis is placed upon the need for obtaining uniform backfill material and uniform compacted density throughout the length of the structure so that equal pressure will be provided. Care is to be taken to insure proper backfill under the structure.

H. Protection of Pipe.

Unless otherwise shown on the plans or permitted in writing by the Engineer/Architect, no heavy earth moving equipment will be permitted to haul over the structure until a minimum of four (4) feet of compacted fill (permanent or temporary) has been placed over the top of the structure.

Prior to adding each new layer of loose backfill material, until a minimum of twelve (12) inches of cover is obtained, an inspection will be made of the inside periphery of the structure for local or unequal deformation caused by improper construction methods. Evidence of such will be reason for such corrective measures as may be directed by the Engineer/Architect.

Pipe damaged by the CONTRACTOR shall be removed and replaced by the CONTRACTOR at no additional cost to the City.

END OF SECTION 02722

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SECTION 02730

SANITARY SEWAGE SYSTEM

PART 1 GENERAL

1.1 PROVISIONS

- A. Throughout the specifications, types of materials may be specified by manufacturer's name and catalogue number in order to establish standards of quality and performance and not for the purpose of limiting competition. Alternate methods and/or materials may be submitted to the Engineer for consideration. Those judged to be equal to that specified will receive written approval.

1.2 DESCRIPTION

- A. Work covered by this Section includes furnishing of and paying for all materials, labor, services, equipment, licenses, taxes, other items, and appliances necessary for the execution, installation and completion of all work specified herein and/or shown on the drawing.
- B. The Work described in this section of the specifications includes, but is not limited to, the following:
 - 1. Relocate sewer service to backwash pit.

1.3 RELATED WORK

- A. The following items of related work are specified and included in other sections of these specifications:
 - 1. Section 02220 - Excavating, Backfilling and Compacting.

PART 2 PRODUCTS

2.1 SANITARY SEWER MAIN

The pipe for the gravity sewer shall be PVC SDR 35 sewer pipe, ASTM Specification D3034(PSM), made from plastic having cell classification of 12454-B as defined in ASTM D1784. All wyes, tees, and bends shall be manufactured of the same material as the sewer pipe used and all wyes or ends of service shall be equipped with a watertight plug. All sewer pipe shall be installed using either Class I embedment materials.

2.2 SANITARY SEWER SERVICE

4" PVC SDR 35 sewer pipe as specified above shall be used for service gravity sewer. Maintain minimum slope of 1% for all service lines.

PART 3 EXECUTION

3.1 GENERAL

All equipment necessary and required for the proper construction of the sanitary sewers

shall be on the project in first class working condition. The contractor shall provide the necessary hand tampers and pneumatic tampers to obtain the compaction of the pipe bed and backfill as specified. In order to comply with the requirements of the Arkansas State Health Department, the contractor shall maintain a minimum of ten (10) feet of horizontal separation between water and sewer lines when they are installed parallel and a vertical separation of 18" (minimum) when these lines cross.

Backfilling operations shall not lag more than 500 feet behind laying operations unless written authorization to do otherwise is given by the Engineer. The contractor shall mark all trenches left open at the end of the working day with appropriate barriers, lights, and signs as required by the various safety codes.

3.2 EXCAVATION

- A. The Contractor shall do all excavation to the depth shown on the plans. Common excavation shall include all excavation including such rock as may be encountered in the trench. If the soil at the bottom of the trench is mucky, or in such condition that it cannot be properly shaped and graded, or if this material is too soft to properly support the bedding material, the contractor shall excavate below the normal subgrade elevation as directed by the Engineer. Whenever excavation is carried below the subgrade, at the direction of the Engineer, the contractor shall provide and install a foundation material of gravel or crushed stone thoroughly tamped into place up to an elevation sufficient to prepare the bedding as specified. A minimum of 6 inches of such foundation material will be required.
- B. Where rock excavation is encountered in trench, the contractor shall excavate to the depth shown on the plans plus at least six inches (6"). A bedding material of at least six (6") inches shall be placed between the rock and the bottom of the pipe. This bedding shall consist of ballast, concrete aggregate or other acceptable graded or crushed stone material as shown on the plans. The depth of cut shown on the plans is from the surface of the ground to the invert of the pipe. The width of the trench at the top of the pipe shall be the outside diameter of the pipe bells plus twelve inches, minimum, and plus sixteen inches maximum. The bed for the pipe shall be so shaped that at least the lower quarter of the pipe shall be in continuous contact with the top of the bedding. The contractor shall do all bracing, sheathing, and shoring necessary to perform and protect all excavations required to prepare trenches for laying and installing pipe, and other structures incidental to the construction of this sewer system.

3.3 LAYING AND INSTALLING PIPE

The contractor shall provide a laser beam type grade light to insure the pipe is laid to the lines and grade shown on the plans. The Engineer shall inspect all pipe before it is laid and reject any pipe damaged or defective. Laying of pipe shall be started at the lowest point and be laid up grade. The pipe shall be protected from water during placing and until joints are made.

3.4 BACKFILLING

All trenches and excavations shall be backfilled in a reasonable time after the pipe is installed and bedded. Backfill material shall be shown on the standard detail drawings. Select backfill material containing stones or rock exceeding three inches (3") in diameter

shall not be used adjacent to the pipe or until the fill over the pipe exceeds one foot (1') in common excavation and two feet (2') in rock excavation. No haunching or initial backfill material may be dropped from a height exceeding two feet (2') over the top of the pipe. Compaction of the bedding, haunching, and initial backfill material shall be obtained by hand tamping method until cover exists over the pipe as shown on the standard trench detail drawings. General backfill material containing large clods or stones larger than six inches (6") in diameter shall not be placed in trenches. In trenches located in paved streets, the general backfill shall be made in layers not to exceed six inches (6") and shall be compacted to a density of 95% Modified Proctor by pneumatic tampers or other equipment approved by the Engineer in such manner that minimal settling of the trench will occur. The contractor will top the backfill by placing the stone or gravel base material level with the existing surface. The crossing shall then be opened to traffic for a period of at least three weeks before the finished surface is placed. Where sufficient backfill material is not available for any of the above operations, it shall be hauled to the work site by the contractor.

3.7 TESTING OF GRAVITY SEWERS AND MANHOLES

Mandrel deflection testing is required for gravity sewer lines. Deflection shall not exceed 5 percent. Tests for water tightness shall be made on each section of sewer line by the contractor in the presence of the Engineer or his authorized representative by one of the following methods:

A. Exterior Saturated Ground Water Pressure - Infiltration due to exterior ground water pressure shall not exceed 50 gallons per mile per inch diameter per day. The contractor shall furnish all equipment necessary for the completion of this test. If dependable results cannot be achieved due to a low ground water table, the low pressure air loss method shall be used. This method (the E.S.G.W.P.) shall be used only when the ground water table is over the top of the sewer pipe.

B. Low Pressure Air Loss - for testing the water tightness of sewer lines. The contractor shall furnish all equipment necessary for this test. The test shall be conducted following procedures outlined. Air pressure in the lines shall not exceed 5.0 psig. An internal pressure of 3.5 psig minimum shall be maintained for at least 5 minutes. After the stabilization period, the time required for a pressure loss of 0.5 psig (3.5 psig to 3.0 psig) will be recorded. If the time for this pressure loss is greater than that shown in the table below, the section undergoing the test shall have passed.

END OF SECTION

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SECTION 02741 HOT-MIX ASPHALT (HMA) FOR ROADS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 17	(1994) Mineral Filler for Bituminous Paving Mixtures
AASHTO M 20	(1994) Penetration Graded Asphalt Cement
AASHTO M 226	(1994) Viscosity Graded Asphalt Cement
AASHTO T 11	(1994) Materials Finer Than 75-Micrometer (No. 200) Sieve in Mineral Aggregates by Washing
AASHTO T 27	(1994) Sieve Analysis of Fine and Coarse Aggregates
AASHTO T 30	(1994) Mechanical Analysis of Extracted Aggregate
AASHTO T 164	(1994) Quantitative Extraction of Bitumen From Bituminous Paving Mixtures
AASHTO T 166	(1994) Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface -Dry Specimens

ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT (AHTD)

Standard Specifications for Highway Construction (2003 Edition)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 2950	(1997) Density of Bituminous Concrete in Place by Nuclear Method
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1.2 MEASUREMENT AND PAYMENT

Subsections 407.05 and 407.06 of the AHTD Standard Specifications for Highway Construction are not applicable.

1.3 STANDARD SPECIFICATIONS

Asphaltic concrete hot mix surface course shall conform to the provisions of Section 407 - Asphalt Concrete Hot Mix Surface Course, Section 409. Materials and Equipment for Asphalt Concrete Hot Mix Binder and Surface Courses, and Section 410 - Construction

Requirements for Asphalt Concrete Hot Mix Binder and Surface Courses of the Arkansas State Highway and Transportation Department "Standard Specifications for Highway Construction", except as specified herein. Reference hereinafter to the Arkansas State Highway and Transportation Department "Standard Specifications for Highway Construction" will be by the basic designation "Standard Specifications". The words "Chief Engineer" or "Engineer" in the Standard Specifications shall be interpreted to mean "Contracting Officer". In case of conflict between the Standard Specifications and this specification, this specification shall govern. Copies of the Standard Specifications may be obtained from the Arkansas State Highway and Transportation Department, Little Rock, Arkansas, for \$8 per copy.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01300 SUBMITTAL PROCEDURES:

SD-O3 Product Data

Physical Characteristics of Asphalt Cement.

The specific physical characteristics of the asphalt cement grade proposed shall be submitted to the Contracting Officer for approval.

SD-07 Certificates

Mix Designs (Contractor and Job).

The Contractor shall submit the job mix formula for asphaltic concrete to the Contracting Officer for approval.

The Contractor shall furnish certificates of compliance with the requirements of penetration grade 60-70 asphalt cement in Table 1 of AASHTO M 20 for each lot of asphalt cement used in the production of asphalt mixture used in this contract. If the Contractor furnishes the viscosity-graded asphalt cement as permitted in paragraph: Asphalt Cement, he shall submit certificates of compliance for that material.

1.5 EQUIPMENT

1.5.1 General Requirements

Batching plant, rollers and mechanical spreading and finishing equipment shall be as specified in Subsections 409.03 through 409.05 of the Standard Specifications. The pavement lay-down machine shall be equipped with an automatic screed control.

1.5.2 Scales

Scales shall be standard truck scales of the beam type and of sufficient size and capacity to accommodate all trucks to be used by the Contractor in handling bituminous mixtures. Scales shall be tested and approved by an inspector of the State Inspection Bureau, charged with scale inspection within the State in which the project is located. If such testing by an inspection bureau is not available, the scales will be tested by the Contractor in the presence of the Contracting Officer.

The necessary number of standard weights for testing the scales shall be on hand at all times. Scales shall meet the minimum requirements of the State Inspection Bureau.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Mineral Aggregate

Mineral aggregate shall be as specified in Sections 407 and 409 of the Standard Specifications for asphaltic concrete hot mix surface course, except as specified herein.

2.1.2 Asphalt Cement

The asphalt cement shall be as specified for penetration grade 60-70 in Table 1 of AASHTO M 20. The Contractor may furnish a viscosity graded asphalt cement. The viscosity graded asphalt cement furnished shall be in accordance with AASHTO M 226 as revised herein. Specific physical requirements to be met are those set forth in Table II of AASHTO M 226 with the following added grade.

TEST	VISCOSITY GRADE
	AC-30
	Viscosity, 60C (140F), poises
	3000± 600
Viscosity, 135C (274F), cs-minimum	350
Penetration, 25c (77F), IOOg, 5 sec. -minimum	55
Flash Point, COC, C(F)-minimum	450
Solubility in trihaloroethylene. Percent-minimum	99.0
Tests on Residue from Thin-Film Oven Test:	
Loss on heating, percent—maximum	0.5
Viscosity, 60C (140F), poises-maximum	12,000
Ductility, 25C (77F), 5 cm/mm., cm-minimum	100
Spot Test	Negative

Change the requirement on Ductility for Grades AC-10, AC-20, and AC-40 to 40 inch minimum.

If required, the asphalt cement shall contain a heat-stable anti-stripping additive. The additive shall be one approved by the Contracting Officer. It shall be added at the rate specified by the Contracting Officer as determined by laboratory analysis, depending on the brand name, concentration of the additive and laboratory mix design. The anti-stripping additive shall be added either to the supply fill line as the tanker is filled at the refinery or at the hot mix plant in a method approved by the Contracting Officer. In either case, the additive shall be thoroughly mixed with the asphalt cement. The anti-stripping additive will not be paid for directly, but will be considered subsidiary to the item of asphalt cement.

2.2 JOB MIX MATERIALS

2.2.1 Approved Source

If the paving material is to be furnished from an existing plant that has been

furnishing material meeting the requirements of Section 407 of the Standard Specifications for work for the Arkansas State Highway and Transportation Department, the state-approved job mix formula for Type 2 Asphaltic Concrete Hot Mix Surface Course may be used. This job mix formula shall be submitted to the Contracting Officer for approval.

2.2.2 New Source

If the paving material is to be furnished from a new plant, or an existing plant that has not been furnishing material meeting requirements of Section 407 of the Standard Specifications for work for the Arkansas State Highway and Transportation Department, the job-mix formula shall be designed by the Contractor and furnished to the Contracting Officer for approval prior to use. The job-mix formula will meet the requirements of the Standard Specifications.

PART 3 EXECUTION

3.1 APPLICATION OF ASPHALTIC CONCRETE SURFACE COURSE

Type 2 asphaltic concrete surface course shall be laid to the typical section or sections indicated on the drawings or specified for the particular road and in accordance with Section 410 of the Standard Specifications or as otherwise specified herein.

3.1.1 Automatic Screed Control

The automatic screed control system shall be used for laying sections of roadway but will not be required on parking areas, camping turnouts, intersections, short loops, or non-typical width sections of roadways.

3.1.2 Establishment of Rolling Pattern

The Contractor shall establish a rolling pattern that will produce the required density at the beginning of pavement operations. The Contractor shall lay a strip of the required pavement, not to exceed 100 feet in length, and use a nuclear density gauge to determine the number of roller coverages necessary to achieve the required density. No further paving shall be performed until an acceptable rolling pattern is established. If the density achieved is unacceptable, then the compaction method or equipment shall be changed and a new rolling pattern established. Also, a new rolling pattern shall be established after any change in the job mix. Final acceptance of the pavement will be based on density tests on samples taken from the finished pavement.

3.2 TESTING

Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government. Testing shall be performed by a commercial testing laboratory approved by the Contracting Officer or may be performed by the Contractor when approved in writing by the Contracting Officer. Tests to be performed shall be as specified or as otherwise specified by the Contracting Officer.

3.2.1 Density of Pavement

One sample for density determination shall be sawed or cored from the finished pavement for each 200 tons or less of bituminous mix placed each day of this contract and tested in accordance with AASHTO T166. Sample locations shall be

selected by the Contracting Officer. Additional samples and testing may be required if any sample fails to meet density requirements.

3.2.2 Fine and Coarse Aggregates

Fine and coarse aggregates shall be tested once for each day of operation in accordance with AASHTO T11, T27, and 30, as applicable.

3.2.3 Mineral Filler for Bituminous Paving Mixtures

Mineral filler shall be tested once for each day of operation in accordance with AASHTO M17.

3.2.4 Extraction Tests on Bituminous Mixtures

One extraction test on the paving mixture shall be made in accordance with AASHTO T 164 for each day of operation.

3.2.5 Thickness Check Tests

Thickness check tests shall be performed every 50 lineal feet of asphalt roadway using a straightedge and ruler.

END OF SECTION

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SECTION 02760
FIELD MOLDED SEALANTS FOR SEALING JOINTS IN RIGID PAVEMENTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in this text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 509	(1994) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM D 789	(1998) Determination of Relative Viscosity and Moisture Content of Polyamide (PA)
ASTM D 3405	(1997) Joint Sealants, Hot-Applied, for Concrete and Asphalt Pavements

1.2 SUBMITTALS

Engineer's approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-03 Product Data

Materials List; G

List of all materials required and the manufacture's data for each material listed 30 days prior to use on the project.

Manufacturer's Recommendations; G

Where installation procedures, or any part thereof, are required to be in accordance with the manufacturer's recommendations, printed copies of these recommendations, 30 days prior to use on the project. Installation of the material will not be allowed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

Construction Equipment List; G

List of proposed equipment to be used in performance of construction work including descriptive data, 45 days prior to use on the project.

SD-04 Samples

Materials; G

Samples of the materials (sealant, primer if required, and backup material), in sufficient quantity for testing and approval 30 days prior to the beginning of work. No material will be allowed to be used until it has been approved.

1.3 TEST REQUIREMENTS

The joint sealant and backup or separating material shall be tested for conformance with the referenced

applicable material specification. Testing of the materials shall be performed in an approved independent laboratory and certified copies of the test reports shall be submitted and approved 30 days prior to the use of the materials at the job site. Samples will be retained by the Government for possible future testing should the materials appear defective during or after application. Conformance with the requirements of the laboratory tests specified will not constitute final acceptance of the materials. Final acceptance will be based on the performance of the in-place materials.

1.4 EQUIPMENT

Machines, tools, and equipment used in the performance of the work required by this section shall be approved before the work is started and shall be maintained in satisfactory condition at all times.

1.4.1 Joint Cleaning Equipment

1.4.1.1 Tractor-Mounted Routing Tool

The routing tool used for removing old sealant from the joints shall be of such shape and dimensions and so mounted on the tractor that it will not damage the sides of the joints. The tool shall be designed so that it can be adjusted to remove the old material to varying depths as required. The use of V-shaped tools or rotary impact routing devices will not be permitted. Hand-operated spindle routing devices may be used to clean and enlarge random cracks.

1.4.1.2 Concrete Saw

A self-propelled power saw with water-cooled diamond or abrasive saw blades will be provided for cutting joints to the depths and widths specified or for refacing joints or cleaning sawed joints where sandblasting does not provide a clean joint.

1.4.1.3 Sandblasting Equipment

Sandblasting equipment shall include an air compressor, hose, and long-wearing venturi-type nozzle of proper size, shape and opening. The maximum nozzle opening should not exceed 6.4 mm. The air compressor shall be portable and shall be capable of furnishing not less than 71 liters per second and maintaining a line pressure of not less than 621 kPa at the nozzle while in use. Compressor capability under job conditions must be demonstrated before approval. The compressor shall be equipped with traps that will maintain the compressed air free of oil and water. The nozzle shall have an adjustable guide that will hold the nozzle aligned with the joint approximately 1 inch above the pavement surface. The height, angle of inclination and the size of the nozzle shall be adjusted as necessary to secure satisfactory results.

1.4.1.4 Waterblasting Equipment

Waterblasting equipment shall include a trailer-mounted water tank, pumps, high-pressure hose, wand with safety release cutoff control, nozzle~ and auxiliary water resupply equipment. The water tank and auxiliary resupply equipment shall be of sufficient capacity to permit continuous operations. The nozzle shall have an adjustable guide that will hold the nozzle aligned with the joint approximately 1 inch above the pavement surface. The height, angle of inclination and the size of the nozzle shall be adjustable as necessary to obtain satisfactory results. A pressure gauge mounted at the pump shall show at all times the pressure in pounds per square inch at which the equipment is operating.

1.4.1.5 Hand Tools

Hand tools may be used, when approved, for removing defective sealant from a crack and repairing or cleaning the crack faces.

1.4.2 Sealing Equipment

1.4.2.1 Hot-Poured Sealing Equipment

The unit applicators used for heating and installing ASTM D 3405 joint sealant materials shall be mobile and shall be equipped with a double-boiler, agitator-type kettle with an oil medium in the outer space for heat transfer; a direct-connected pressure-type extruding device with a nozzle shaped for inserting in the joint to be filled; positive temperature devices for controlling the temperature of the transfer oil and sealant; and a recording type thermometer for indicating the temperature of the sealant. The applicator unit shall be designed so that the sealant will circulate through the delivery hose and return to the inner kettle when not in use.

1.5 TRIAL JOINT SEALANT INSTALLATION

Prior to the cleaning and sealing of the joints for the entire project, a test section of at least 60 m long shall be prepared using the specified materials and approved equipment, so as to demonstrate the proposed joint preparation and sealing of all types of joints in the project. Following the completion of the test section and before any other joint is sealed, the test section shall be inspected to determine that the materials and installation meet the requirements specified. If it is determined that the materials or installation do not meet the requirements, the materials shall be removed, and the joints shall be recleaned and resealed at no cost to the Government. When the test section meets the requirements, it may be incorporated into the permanent work and paid for at the contract unit price per linear foot for sealing items scheduled. All other joints shall be prepared and sealed in the manner approved for sealing the test section.

1.6 DELIVERY AND STORAGE

Materials delivered to the job site shall be inspected for defects, unloaded, and stored with a minimum of handling to avoid damage. Storage facilities shall be provided by the Contractor at the job site for maintaining materials at the temperatures and conditions recommended by the manufacturer.

1.7 ENVIRONMENTAL CONDITIONS

The ambient air temperature and the pavement temperature within the joint wall shall be a minimum of 10 degrees C and rising at the time of application of the materials. Sealant shall not be applied if moisture is observed in the joint.

PART 2 PRODUCTS

2.1 SEALANTS

Materials for sealing cracks in the paved areas indicated on the drawings shall be as follows: ASTM D 3405 AND COE CRD-C 525

2.2 PRIMERS

Primers, when their use is recommended by the manufacturer of the sealant, shall be as recommended by the manufacturer of the sealant.

2.3 BACKUP MATERIALS

The backup material shall be a compressible, nonshrinking, nonstaining, nonabsorbing material and shall be nonreactive with the joint sealant. The material shall have a melting point at least 3 degrees C greater than the pouring temperature of the sealant being used when tested in accordance with ASTM D 789. The material shall have a water absorption of not more than 5 percent of the sample weight when tested in accordance with ASTM C 509. The backup material shall be 25 plus or minus 5 percent larger in diameter than the nominal width of the crack.

2.4 BOND BREAKING TAPES

The bond breaking tape or separating material shall be a flexible, nonshrinkable, nonabsorbing, nonstaining, and nonreacting adhesive—backed tape. The material shall have a melting point at least 3 degrees C greater than the pouring temperature of the sealant being used when tested in accordance with ASTM D 789. The bond breaker tape shall be approximately 3 mm wider than the nominal width of the joint and shall not bond to the joint sealant.

PART 3 EXECUTION

3.1 PREPARATION OF JOINTS

Immediately before the installation of the sealant, the joints shall be thoroughly cleaned to remove all laitance, curing compound, filler, protrusions of hardened concrete, and old sealant from the sides and upper edges of the joint space to be sealed.

3.1.1 Existing Sealant Removal

The in-place sealant shall be cut loose from both joint faces and to the depth shown on the drawings, using the concrete saw as specified in paragraph EQUIPMENT. Depth shall be sufficient to accommodate any separating or backup material that is required to maintain the depth of new sealant to be installed. Prior to further cleaning operations, all loose old sealant remaining in the joint opening shall be removed by blowing with compressed air. Hand tools may be required to remove sealant from random cracks. Chipping, spalling, or otherwise damaging the concrete will not be allowed.

3.1.2 Facing of Joints

Facing of joints shall be accomplished using a concrete saw as specified in paragraph EQUIPMENT. The blade shall be stiffened with a sufficient number of suitable dummy (used) blades or washers. Immediately following the sawing operation, the joint opening shall be thoroughly cleaned using a water jet to remove all saw cuttings and debris.

3.1.3 Refacing of Random Cracks

Sawing of the cracks shall be accomplished using a power-driven concrete saw as specified in paragraph EQUIPMENT. The saw blade shall be 152 mm or less in diameter to enable the saw to follow the trace of the crack. The blade shall be stiffened as necessary with suitable dummy (or used) blades or washers. Immediately following the sawing operation, the crack opening shall be thoroughly cleaned using a water jet to remove all saw cuttings and debris.

3.1.4 Sandblasting

The newly exposed concrete joint faces and the pavement surfaces extending a minimum of 13 mm from the joint edges shall be sandblasted clean. A multiple-pass technique shall be used until the surfaces are free of dust, dirt, curing compound, filler, old sealant residue, or any foreign debris that might prevent the bonding of the sealant to the concrete. After final cleaning and immediately prior to sealing, the joints shall be blown out with compressed air and left completely free of debris and water.

3.1.5 Back-Up Material

When the joint opening is of a greater depth than indicated for the sealant depth, the lower portion of the joint opening shall be plugged or sealed off using a back-up material to prevent the entrance of the sealant below the specified depth. Care shall be taken to ensure that the backup material is placed at the specified depth and is not stretched or twisted during installation.

3.1.8 Bond Breaking Tape

Where inserts or filler materials contain bitumen, or the depth of the joint opening does not allow for the use of a backup material, a bond breaker separating tape will be inserted to prevent incompatibility with

the filler materials and three-sided adhesion of the sealant. The tape shall be securely bonded to the bottom of the joint opening so it will not float up into the new sealant.

3.1.7 Rate of Progress of Joint Preparation

The stages of joint preparation, which include sand blasting, air pressure cleaning and placing of the back-up material shall be limited to only that lineal footage that can be sealed during the same day.

3.2 PREPARATION OF SEALANT

3.2.1 Hot-Poured Sealants

Sealants conforming to ASTM D 3405 shall not be heated in excess of the safe heating temperature recommended by the manufacturer as shown on the sealant containers. Sealant that has been overheated or subjected to application temperatures for over 4 hours or that has remained in the applicator at the end of the day's operation shall be withdrawn and wasted.

3.3 INSTALLATION OF SEALANT

3.3.1 Time of Application

Joints shall be sealed immediately following final cleaning of the joint walls and following the placement of the separating or backup material. Open joints that cannot be sealed under the conditions specified, or when rain interrupts sealing operations shall be recleaned and allowed to dry prior to installing the sealant.

3.3.2 Sealing Joints

Immediately proceeding, but not more than 15 m ahead of the joint sealing operations, a final cleaning with compressed air shall be performed. The joints shall be filled from the bottom up to 3 mm plus or minus 1.5 mm below the pavement surface. Excess or spilled sealant shall be removed from the pavement by approved methods and shall be discarded. The sealant shall be installed in such a manner as to prevent the formation of voids and entrapped air. In no case shall gravity methods or pouring pots be used to install the sealant material. Traffic shall not be permitted over newly sealed pavement until authorized by the Contracting Officer. Then a primer is recommended by the manufacturer, it shall be applied evenly to the joint faces in accordance with the manufacturer's instructions. Joints shall be checked frequently to ensure that the newly installed sealant is cured to a tack-free condition within the time specified.

3.4 INSPECTION

3.4.1 Joint Cleaning

Joints shall be inspected during the cleaning process to correct improper equipment and cleaning techniques that damage the concrete pavement in any manner. Cleaned joints shall be approved prior to installation of the separating or back-up material and joint sealant.

3.4.2 Joint Sealant Application Equipment

The application equipment shall be inspected to ensure conformance to temperature requirement5~proper proportioning and mixing (if two-component sealant) and proper installation. Evidences of bubbling, improper installation, failure to cure or set shall be cause to suspend operations until causes of the deficiencies are determined and corrected.

3.4.3 Joint Sealant

The joint sealant shall be inspected for proper rate of cure and set, bonding to the joint walls, cohesive

separation within the sealant, reversion to liquid, entrapped air and voids. Sealants exhibiting any of these deficiencies at any time prior to the final acceptance of the project shall be removed from the joint, wasted, and replaced as specified herein at no additional cost to the Government.

3.5 CLEAN-UP

Upon completion of the project, all unused materials shall be removed from the site and the pavement shall be left in a clean condition.

END OF SECTION 02760

SECTION 02763 PAVEMENT MARKINGS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 247 (2005) Glass Beads Used in Traffic Paints

ASTM INTERNATIONAL (ASTM)

ASTM D 4280 (2004) Extended Life Type, Nonplowable, Raised, Retroreflective Pavement Markers

ASTM D 4505 (2005) Preformed Retroreflective Pavement Marking Tape for Extended Service Life

ASTM D 792 (2000) Density and Specific Gravity (Relative Density) of Plastics by Displacement

ASTM E 28 (2004) Softening Point of Resins Derived from Naval Stores by Ring and Ball Apparatus

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS TT-B-1325(Rev C) Beads (Glass Spheres) Retro-Reflective (Metric)

FS TT-P-1952(Rev D) Paint, Traffic and Airfield Markings, Waterborne

1.2 UNIT PRICES

1.2.1 Measurement

1.2.1.1 Surface Preparation

The unit of measurement for surface preparation will be the number of square meters feet of pavement surface prepared for marking and accepted by the Contracting Officer.

1.2.1.2 Pavement Striping and Markings

The unit of measurement for pavement striping and markings will be the number of square meters feet of reflective and nonreflective striping or marking actually completed and accepted by the Contracting Officer.

1.2.1.3 Raised Pavement Markers

The unit of measurement for raised pavement markers will be the number of square meters feet of each specific color required. Payment will be for the total number actually placed and approved by the Contracting Officer.

1.2.1.4 Removal of Pavement Markings

The unit of measurement for removal of pavement markings shall be the number of square meters feet of pavement markings actually removed and accepted by the Contracting Officer.

1.2.2 Payment

The quantities of surface preparation, pavement striping or markings, raised pavement markers, and removal of pavement markings determined as specified in paragraph Measurement, will be paid for at the contract unit price. The payment will constitute full compensation for furnishing all labor, materials, tools, equipment, appliances, and doing all work involved in marking pavements. Any striping or markings which are placed without reflective media, when reflective media is required, shall be removed and replaced at no cost to the Government. Striping or markings which do not conform to the alignment and/or location required shall be removed and replaced at no cost to the Government.

1.3 SUBMITTALS

Engineer's approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval information only. The following shall be submitted in accordance with Section 01300 SUBMITTALS:

SD-03 Product Data

Equipment; [G]

Lists of proposed equipment, including descriptive data, and notifications of proposed Contractor actions as specified in this section. List of removal equipment shall include descriptive data indicating area of coverage per pass, pressure adjustment range, tank and flow capacities, and safety precautions required for the equipment operation.

Composition Requirements

Manufacturer's current printed product description and Material Safety Data Sheets (MSDS) for each type paint/color proposed for use.

Qualifications

Documentation on personnel qualifications, as specified.

SD-06 Test Reports

Sampling and Testing

Certified copies of the test reports, prior to the use of the materials at the jobsite. Testing shall be performed in an approved independent laboratory.

SD-07 Certificates

Volatile Organic Compound (VOC)

Certificate stating that the proposed pavement marking paint meets the VOC regulations of the local Air Pollution Control District having jurisdiction over the geographical area in which the project is located.

1.4 DELIVERY AND STORAGE

All materials shall be delivered and stored in sealed containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, manufacturer's name, and directions, all of which shall be plainly legible at time of use.

1.5 EQUIPMENT

All machines, tools and equipment used in the performance of the work shall be approved and maintained in satisfactory operating condition. Equipment operating on roads and runways shall display low speed traffic markings and traffic warning lights.

1.5.1 Paint Application Equipment

1.5.1.1 Self-Propelled or Mobile-Drawn Pneumatic Spraying Machines

The equipment to apply paint to pavements shall be a self-propelled or mobile-drawn pneumatic spraying machine with suitable arrangements of atomizing nozzles and controls to obtain the specified results. The machine shall have a speed during application not less than 8 km/hour 5 mph, and shall be capable of applying the stripe widths indicated, at the paint coverage rate specified in paragraph APPLICATION, and of even uniform thickness with clear-cut edges. [Equipment used for marking streets and highways shall be capable of placing the prescribed number of lines at a single pass as solid lines, intermittent lines or a combination of solid and intermittent lines using a maximum of two different colors of paint as specified.] [The equipment used to apply the paint binder to airfield pavements shall be a self-propelled or mobile-drawn pneumatic spraying machine with an arrangement of atomizing nozzles capable of applying a line width at any one time in multiples of 150 mm 6 inches, from 150 mm 6 inches to 900 mm 36 inches]. The paint applicator shall have paint reservoirs or tanks of sufficient capacity and suitable gauges to apply paint in accordance with requirements specified. Tanks shall be equipped with suitable air-driven mechanical agitators. The spray mechanism shall be equipped with quick-action valves conveniently located, and shall include necessary pressure regulators and gauges in full view and reach of the operator. Paint strainers shall be installed in paint supply lines to ensure freedom from residue and foreign matter that may cause malfunction of the spray guns. The paint applicator shall be readily adaptable for attachment of an air-actuated dispenser for the reflective media approved for use. Pneumatic spray guns shall be provided for hand application of paint in areas where the mobile paint applicator cannot be used.

1.5.1.2 Hand-Operated, Push-Type Machines

All machines, tools, and equipment used in performance of the work shall be approved and maintained in satisfactory operating condition. Hand-operated push-type machines of a type commonly used for application of paint to pavement surfaces will be acceptable for marking small streets and parking areas. Applicator machine shall be equipped with the necessary paint tanks

and spraying nozzles, and shall be capable of applying paint uniformly at coverage specified. Sandblasting equipment shall be provided as required for cleaning surfaces to be painted. Hand-operated spray guns shall be provided for use in areas where push-type machines cannot be used.

1.5.2 Thermoplastic Application Equipment

1.5.2.1 Thermoplastic Material

Thermoplastic material shall be applied to the primed pavement surface by spray techniques or by the extrusion method, wherein one side of the shaping die is the pavement and the other three sides are contained by, or are part of, suitable equipment for heating and controlling the flow of material. By either method, the markings shall be applied with equipment that is capable of providing continuous uniformity in the dimensions of the stripe.

1.5.2.2 Application Equipment

a. Application equipment shall provide continuous mixing and agitation of the material. Conveying parts of the equipment between the main material reservoir and the extrusion shoe or spray gun shall prevent accumulation and clogging. All parts of the equipment which come into contact with the material shall be easily accessible and exposable for cleaning and maintenance. All mixing and conveying parts up to and including the extrusion shoes and spray guns shall maintain the material at the required temperature with heat-transfer oil or electrical-element-controlled heat.

b. The application equipment shall be constructed to ensure continuous uniformity in the dimensions of the stripe. The applicator shall provide a means for cleanly cutting off stripe ends squarely and shall provide a method of applying "skiplines". The equipment shall be capable of applying varying widths of traffic markings.

c. The applicator shall be equipped with a drop-on type bead dispenser capable of uniformly dispensing reflective glass spheres at controlled rates of flow. The bead dispenser shall be automatically operated and shall begin flow prior to the flow of composition to assure that the strip is fully reflectorized.

1.5.2.3 Mobile and Maneuverable

Application equipment shall be mobile and maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc. The equipment used for the placement of thermoplastic pavement markings shall be of two general types: mobile applicator and portable applicator.

a. Mobile Application Equipment: The mobile applicator shall be defined as a truck-mounted, self-contained pavement marking machine that is capable of hot applying thermoplastic by either the extrusion or spray method. The unit shall be equipped to apply the thermoplastic marking material at temperatures exceeding 190 degrees C 375 degrees F, at widths varying from 75 to 300 mm 3 to 12 inches and in thicknesses varying from 1.0 to 5.0 mm 0.020 to 0.190 inch and shall have an automatic drop-on bead system. The mobile unit shall be capable of operating continuously and of installing a minimum of 6 km 20,000 lineal feet of longitudinal markings in an 8-hour day.

(1) The mobile unit shall be equipped with a melting kettle which holds a minimum of 2.7 metric tons 6000 pounds of molten thermoplastic material. The kettle shall be capable of heating the thermoplastic composition to temperatures of 195 to 220 degrees C 375 to 425 degrees F. A thermostatically controlled heat transfer liquid shall be used. Heating of the composition by direct flame will not be allowed. Oil and material temperature gauges shall be visible at both ends of the kettle. [The mobile unit shall be equipped with a minimum of two extrusion shoes located one on each side of the truck, and shall be capable of marking simultaneous edgeline and centerline stripes. Each extrusion shoe shall be a closed, oil-jacketed unit; shall hold the molten thermoplastic at a temperature of 195 to 220 degrees C 375 to 425 degrees F; and shall be

capable of extruding a line of 75 to 200 mm 3 to 8 inches in width; and at a thickness of not less than 3 mm 0.125 inch nor more than 5.0 mm 0.190 inch, and of generally uniform cross section.] [The mobile unit shall be equipped with a spray gun system. The spray system shall consist of a minimum of four spray guns, located two on each side of the truck, and shall be capable of marking simultaneous edgeline and centerline stripes. The spray system shall be surrounded (jacketed) with heating oil to maintain the molten thermoplastic at a temperature of 195 to 220 degrees C 375 to 425 degrees F; and shall be capable of spraying a stripe of 75 to 300 mm 3 to 12 inches in width, and in thicknesses varying from 1.5 mm 0.055 inch to 2.5 mm 0.095 inch, and of generally uniform cross section.]

(2) The mobile unit shall be equipped with an electronic programmable line pattern control system. The control system shall be capable of applying skip or solid lines in any sequence, through any and all of the extrusion shoes, or the spray guns, and in programmable cycle lengths. In addition, the mobile unit shall be equipped with an automatic counting mechanism capable of recording the number of lineal meters feet of thermoplastic markings applied to the pavement surface with an accuracy of 0.5 percent.

b. Portable Application Equipment: The portable applicator shall be defined as hand-operated equipment, specifically designed for placing special markings such as crosswalks, stopbars, legends, arrows, and short lengths of lane, edge and centerlines. The portable applicator shall be capable of applying thermoplastic pavement markings by the extrusion method. The portable applicator shall be loaded with hot thermoplastic composition from the melting kettles on the mobile applicator. The portable applicator shall be equipped with all the necessary components, including a materials storage reservoir, bead dispenser, extrusion shoe, and heating accessories, so as to be capable of holding the molten thermoplastic at a temperature of 195 to 220 degrees C 375 to 425 degrees F, of extruding a line of 75 to 300 mm 3 to 12 inches in width, and in thicknesses of not less than 3.0 mm 0.125 inch nor more than 5.0 mm 0.190 inch and of generally uniform cross section.

1.5.3 Reflective Media Dispenser

The dispenser for applying the reflective media shall be attached to the paint dispenser and shall operate automatically and simultaneously with the applicator through the same control mechanism. The dispenser shall be capable of adjustment and designed to provide uniform flow of reflective media over the full length and width of the stripe at the rate of coverage specified in paragraph APPLICATION, at all operating speeds of the applicator to which it is attached.

1.5.4 Preformed Tape Application Equipment

Mechanical application equipment shall be used for the placement of preformed marking tape. Mechanical application equipment shall be defined as a mobile pavement marking machine

specifically designed for use in applying precoated, pressure-sensitive pavement marking tape of varying widths, up to 300 mm 12 inches. The applicator shall be equipped with rollers, or other suitable compactive device, to provide initial adhesion of the preformed, pressure-sensitive marking tape with the pavement surface. Additional hand-operated rollers shall be used as required to properly seat the thermoplastic tape.

1.5.5 Surface Preparation Equipment

1.5.5.1 Sandblasting Equipment

Sandblasting equipment shall include an air compressor, hoses, and nozzles of proper size and capacity as required for cleaning surfaces to be painted. The compressor shall be capable of furnishing not less than 70.8 L/sec 150 cfm of air at a pressure of not less than 620 kPa 90 psi at each nozzle used, and shall be equipped with traps that will maintain the compressed air free of oil and water.

1.5.5.2 Waterblast Equipment

The water pressure shall be specified at 17.9 MPa 2600 psi at 60 degrees C 140 degrees F in order to adequately clean the surfaces to be marked.

1.5.6 Marking Removal Equipment

Equipment shall be mounted on rubber tires and shall be capable of removing markings from the pavement without damaging the pavement surface or joint sealant. Waterblasting equipment shall be capable of producing an adjustable, pressurized stream of water. Sandblasting equipment shall include an air compressor, hoses, and nozzles. The compressor shall be equipped with traps to maintain the air free of oil and water.

1.5.6.1 Shotblasting Equipment

Shotblasting equipment shall be capable of producing an adjustable depth of removal of marking and pavement. Each unit shall be self-cleaning and self-contained, shall be able to confine dust and debris from the operation, and shall be capable of recycling the abrasive for reuse.

1.5.6.2 Chemical Equipment

Chemical equipment shall be capable of application and removal of chemicals from the pavement surface, and shall leave only non-toxic biodegradeable residue.

1.5.7 Traffic Controls

Suitable warning signs shall be placed near the beginning of the worksite and well ahead of the worksite for alerting approaching traffic from both directions. Small markers shall be placed along newly painted lines or freshly placed raised markers to control traffic and prevent damage to newly painted surfaces or displacement of raised pavement markers. Painting equipment shall be marked with large warning signs indicating slow-moving painting equipment in operation.

1.6 MAINTENANCE OF TRAFFIC

1.6.1 Airfield

The performance of work in the controlled zones of airfields shall be coordinated with the Contracting Officer and with the Flight Operations Officer. Verbal communications shall be maintained with the control tower before and during work in the controlled zones of the airfield. The control tower shall be advised when the work is completed. A radio for this purpose [will be provided by the Government] [shall be provided by the Contractor and approved by the Contracting Officer].

1.6.2 Roads, Streets, and Parking Areas

When traffic must be rerouted or controlled to accomplish the work, the necessary warning signs, flagpersons, and related equipment for the safe passage of vehicles shall be provided.

1.7 WEATHER LIMITATIONS FOR REMOVAL

Pavement surface shall be free of snow, ice, or slush. Surface temperature shall be at least 5 degrees C 40 degrees F and rising at the beginning of operations, except those involving shot or sand blasting. Operation shall cease during thunderstorms. Operation shall cease during rainfall, except for waterblasting and removal of previously applied chemicals. Waterblasting shall cease where surface water accumulation alters the effectiveness of material removal.

1.8 QUALIFICATIONS

The Contractor shall submit documentation certifying that pertinent personnel are qualified for equipment operation and handling of chemicals.

PART 2 PRODUCTS

2.1 PAINT

The paint shall be homogeneous, easily stirred to smooth consistency, and shall show no hard settlement or other objectionable characteristics during a storage period of 6 months. Paints for airfields, roads, parking areas, and streets shall conform to FS TT-P-1952, color as [indicated] [selected]. Pavement marking paints shall comply with applicable state and local laws enacted to ensure compliance with Federal Clean Air Standards. Paint materials shall conform to the restrictions of the local Air Pollution Control District.

2.2 THERMOPLASTIC COMPOUNDS

The thermoplastic reflectorized pavement marking compound shall be extruded or sprayed in a molten state onto a primed pavement surface. Following a surface application of glass beads and upon cooling to normal pavement temperatures, the marking shall be an adherent reflectorized strip of the specified thickness and width that is capable of resisting deformation by traffic.

2.2.1 Composition Requirements

The binder component shall be formulated as a hydrocarbon resin. The pigment, beads and filler shall be uniformly dispersed in the binder resin. The thermoplastic composition shall be free from all skins, dirt, and foreign objects and shall comply with the following requirements:

Component	Percent by Weight	
	White	Yellow
Binder	17 min.	17 min.
Titanium dioxide	10 min.	-
Glass beads,	20 min.	20 min.
Calcium carbonate	49 max.	*

& inert fillers

Yellow pigments - *

*Amount and type of yellow pigment, calcium carbonate and inert fillers shall be at the option of the manufacturer, providing the other composition requirements of this specification are met.

2.2.2 Physical Properties

2.2.2.1 Color

The color shall be as indicated.

2.2.2.2 Drying Time

When installed at 20 degrees C 70 degrees F and in thicknesses between 3 and 5 mm 1/8 and 3/16 inch, after curing 15 minutes.

2.2.2.3 Softening Point

The composition shall have a softening point of not less than 90 degrees C 194 degrees F when tested in accordance with ASTM E 28.

2.2.2.4 Specific Gravity

The specific gravity of the composition shall be between 1.9 and 2.2 as determined in accordance with ASTM D 792.

2.2.3 Asphalt Concrete Primer

The primer for asphalt concrete pavements shall be a thermosetting adhesive with a solids content of pigment reinforced synthetic rubber and synthetic plastic resin dissolved and/or dispersed in a volatile organic compound (VOC). Solids content shall not be less than 10 percent by weight at 20 degrees C 70 degrees F and 60 percent relative humidity. A wet film thickness of 0.10 mm 0.005 inch plus or minus 0.025 mm 0.001 inch, shall dry to a tack-free condition in less than 5 minutes.

2.2.4 Portland Cement Concrete Primer

The primer for Portland cement concrete pavements shall be an epoxy resin primer. The primer shall be of the type recommended by the manufacturer of the thermoplastic composition. Epoxy primers recommended by the manufacturer shall be approved by the Contracting Officer prior to use. Requests for approval shall be accompanied with technical data, instructions for use, and a 1 liter 1 quart sample of the primer material.

2.3 PREFORMED TAPE

The preformed tape shall be an adherent reflectorized strip in accordance with ASTM D 4505 Type I or IV, Class optional.

2.4 SAMPLING AND TESTING

Materials proposed for use shall be stored on the project site in sealed and labeled containers, or segregated at source of supply, sufficiently in advance of needs to allow 60 days for testing. Upon notification by the Contractor that the material is at the site or source of supply, a sample shall be taken by random selection from sealed containers by the Contractor in the presence of a representative of the Contracting Officer. Samples shall be clearly identified by designated name, specification number, batch number, manufacturer's formulation number, project contract number, intended use, and quantity involved. [Materials will be sampled and tested by the Government. No material shall be used at the project prior to receipt by the Contractor of written notice that the materials meet the laboratory requirements. The cost of initial testing of samples from each lot of materials will be borne by the Government. If the sample fails to meet specification requirements, the material represented by the sample shall be replaced and the new material will be tested. Cost of sampling and testing the new material will be borne by the Contractor.] [Testing shall be performed in an approved independent laboratory. If materials are approved based on reports furnished by the Contractor, samples will be retained by the Government for possible future testing should the material appear defective during or after application.]

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Surfaces to be marked shall be thoroughly cleaned before application of the pavement marking material. Dust, dirt, and other granular surface deposits shall be removed by sweeping, blowing with compressed air, rinsing with water or a combination of these methods as required. Rubber deposits, surface laitance, existing paint markings, and other coatings adhering to the pavement shall be completely removed with scrapers, wire brushes, sandblasting, approved chemicals, or mechanical abrasion as directed. Areas of old pavement affected with oil or grease shall be scrubbed with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinsed thoroughly after each application. After cleaning, oil-soaked areas shall be sealed with cut shellac to prevent bleeding through the new paint. Pavement surfaces shall be allowed to dry, when water is used for cleaning, prior to striping or marking. Surfaces shall be recleaned, when work has been stopped due to rain.

3.1.1 Pretreatment for Early Painting

Where early painting is required on rigid pavements, a pretreatment with an aqueous solution containing 3 percent phosphoric acid and 2 percent zinc chloride shall be applied to prepared pavement areas prior to painting.

3.1.2 Cleaning Existing Pavement Markings

In general, markings shall not be placed over existing pavement marking patterns. Existing pavement markings, which are in good condition but interfere or conflict with the newly applied marking patterns, shall be removed. Deteriorated or obscured markings that are not misleading or confusing or interfere with the adhesion of the new marking material do not require removal. New preformed and thermoplastic pavement markings shall not be applied over existing preformed or thermoplastic markings. Whenever grinding, scraping, sandblasting or other operations are performed the work must be conducted in such a manner that the finished pavement surface is not damaged or left in a pattern that is misleading or confusing. When these operations are completed the pavement surface shall be blown off with compressed air to remove residue and debris resulting from the cleaning work.

3.1.3 Cleaning Concrete Curing Compounds

On new Portland cement concrete pavements, cleaning operations shall not begin until a minimum of 30 days after the placement of concrete. All new concrete pavements shall be cleaned by either sandblasting or water blasting. When water blasting is performed, thermoplastic and preformed markings shall be applied no sooner than 24 hours after the blasting has been completed. The extent of the blasting work shall be to clean and prepare the concrete surface as follows:

- a. There is no visible evidence of curing compound on the peaks of the textured concrete surface.
- b. There are no heavy puddled deposits of curing compound in the valleys of the textured concrete surface.
- c. All remaining curing compound is intact; all loose and flaking material is removed.
- d. The peaks of the textured pavement surface are rounded in profile and free of sharp edges and irregularities.
- e. The surface to be marked is dry.

3.2 APPLICATION

All pavement markings and patterns shall be placed as shown on the plans.

3.2.1 Paint

Paint shall be applied to clean, dry surfaces, and only when air and pavement temperatures are above 5 degrees C 40 degrees F and less than 35 degrees C 95 degrees F. Paint temperature shall be maintained within these same limits. New asphalt pavement surfaces and new Portland concrete cement shall be allowed to cure for a period of not less than 30 days before applications of paint. Paint shall be applied pneumatically with approved equipment at rate of coverage specified. The Contractor shall provide guide lines and templates as necessary to control paint application. Special precautions shall be taken in marking numbers, letters, and symbols. Edges of markings shall be sharply outlined.

3.2.1.1 Rate of Application

a. Reflective Markings: Pigmented binder shall be applied evenly to the pavement area to be coated at a rate of 2.9 plus or minus 0.5 square meter/L 105 plus or minus 5 square feet/gallon. Glass spheres shall be applied uniformly to the wet paint [on airfield pavement at a rate of 1.0 8] [on road and street pavement at a rate of 0.7 6] plus or minus 0.06 kg 0.5 pounds of glass spheres per L gallon of paint.

b. Nonreflective Markings: Paint shall be applied evenly to the pavement surface to be coated at a rate of 2.9 plus or minus 0.5 square meter/L 105 plus or minus 5 square feet/gallon.

3.2.1.2 Drying

The maximum drying time requirements of the paint specifications will be strictly enforced to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. If there is a delay in drying of the markings, painting operations shall be discontinued until cause of the slow drying is determined and corrected.

3.2.2 Thermoplastic Compounds

Thermoplastic pavement markings shall be placed upon dry pavement; surface dry only will not be considered an acceptable condition. At the time of installation, the pavement surface temperature shall be a minimum of 5 degrees C 40 degrees F and rising. Thermoplastics, as placed, shall be free from dirt or tint.

3.2.2.1 Longitudinal Markings

All centerline, skipline, edgeline, and other longitudinal type markings shall be applied with a mobile applicator. All special markings, crosswalks, stop bars, legends, arrows, and similar patterns shall be placed with a portable applicator, using the extrusion method.

3.2.2.2 Primer

After surface preparation has been completed the asphalt and/or concrete pavement surface shall be primed. The primer shall be applied with spray equipment. Primer materials shall be allowed to "set-up" prior to applying the thermoplastic composition. The asphalt concrete primer shall be allowed to dry to a tack-free condition, usually occurring in less than 10 minutes. The Portland cement concrete primer shall be allowed to dry in accordance with the thermoplastic manufacturer's recommendations. To shorten the curing time of the epoxy resins an infrared heating device may be used on the concrete primer.

- a. Asphalt Concrete Primer: Primer shall be applied to all asphalt concrete pavements at a wet film thickness of 0.10 mm 0.005 inch, plus or minus 0.025 mm 0.001 inch (25-40 square meters/L 265-400 square feet/gallon).
- b. Portland Cement Concrete Primer: Primer shall be applied to all concrete pavements (including concrete bridge decks) at a wet film thickness of between 1.0 to 1.3 mm 0.04 to 0.05 inch (30-40 square meters/L 320-400 square feet/gallon).

3.2.2.3 Markings

After the primer has "set-up", the thermoplastic shall be applied at temperatures no lower than 190 degrees C 375 degrees F nor higher than 220 degrees C 425 degrees F at the point of deposition. Immediately after installation of the marking, drop-on glass spheres shall be mechanically applied so that the spheres are held by and imbedded in the surface of the molten material.

- a. Extruded Markings: All extruded thermoplastic markings shall be applied at the specified width and at a thickness of not less than 3.0 mm 0.125 inch nor more than 5.0 mm 0.190 inch.
- b. Sprayed Markings: All sprayed thermoplastic markings shall be applied at the specified width and the thicknesses designated in the contract plans. If the plans do not specify a thickness, centerline markings shall be applied at a wet thickness of 2.0 mm 0.090 inch, plus or minus 0.10 mm 0.005 inch, and edgeline markings at a wet thickness of 1.5 mm 0.060 inch plus or minus 0.10 mm 0.005 inch.
- c. Reflective Glass Spheres: Immediately following application, reflective glass spheres shall be dropped onto the molten thermoplastic marking at the rate of 1 kg/2 square meters 1 pound/20 square feet of compound.

3.2.3 Preformed Tape

The pavement surface temperature shall be a minimum of 15 degrees C 60 degrees F and the ambient temperature shall be a minimum of 15 degrees C 60 degrees F and rising. The preformed markings shall be placed in accordance with the manufacturer's written instructions.

3.3 MARKING REMOVAL

Pavement marking, including plastic tape, shall be removed in the areas shown on the drawings. Removal of marking shall be as complete as possible without damage to the surface. Aggregate shall not be exposed by the removal process. After the markings are removed, the cleaned pavement surfaces shall exhibit adequate texture for remarking as specified in paragraph SURFACE PREPARATION. Contractor shall demonstrate removal of pavement marking in an area designated by the Contracting Officer. The demonstration area will become the standard for the remainder of the work.

3.3.1 Equipment Operation

Equipment shall be controlled and operated to remove markings from the pavement surface, prevent dilution or removal of binder from underlying pavement, and prevent emission of blue smoke from asphalt or tar surfaces.

3.3.2 Cleanup and Waste Disposal

The worksite shall be kept clean of debris and waste from the removal operations. Cleanup shall immediately follow removal operations in areas subject to air traffic. Debris shall be disposed of at approved sites.

END OF SECTION

SECTION 02812
LANDSCAPE IRRIGATION SYSTEM PERFORMANCE

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Pipe sleeves under paving for irrigation system.
- B. Pipe and fittings, valves, outlets, backflow preventer, and accessories.
- C. Connection to utilities and meter installation.
- D. Automatic control system.

1.02 RELATED SECTIONS

- A. Section 02210 - Grading.
- B. Section 02920 – Lawns and Grasses.

1.03 REFERENCES

- A. ASTM D 2241 - Poly Vinyl Chloride (PVC) Plastic Pipe (SDR-PR).
- B. ANSI/ASTM D 2564 - Solvent Cement for Poly Vinyl Chloride (PVC) Plastic Pipe and Fittings.

1.04 DESIGN AND SYSTEM DESCRIPTION

- A. Contractor's design for automatic, electric valve, irrigation system 100 percent coverage and minimal over spray onto buildings and paved surfaces to meet the following design standards:
 - 1. Separate valve zones for turf and bed areas.
 - 2. Space outlets (sprinkler heads) to provide near 100% overlapped coverage between each outlet.
 - 3. Specify sizing for all piping, and equipment items.
 - 4. Specify locations for controller and backflow preveter and coordinate with owner and general contractor.
 - 5. Piping to be located along back of curbs, pavement edges, and bed edges.
 - 6. Spray from perimeter of areas where feasible.
 - 7. Specify equipment brand/s proposed for use.
 - 8. Provide 100% coverage of all newly planted landscape areas and/or other areas as indicated in the Landscape Plan.
 - 9. Minimize the number of outlets, trenching, and pipe installation where possible.
 - 10. Indicate size and locations for irrigation sleeves and coordinate installation with general contractor.
 - 11. Water meter to be provide by General Contractor.
- B. System shall include the following components:
 - 1. PVC pipe and fittings.
 - 2. Backflow preventer device, manual ball valve, and insulated fiberglass housing.
 - 3. Automatic controller and connection to power source.
 - 4. Master valve and zone valves.
 - 5. Valve boxes and covers.

6. Pop-up spray and stream rotor type outlets (sprinkler heads).
7. Rain sensor shutoff device.
8. Low point manual drain valves and drain sumps.
9. 6" PVC pipe sleeves at all pavement crossings. Coordinate with owner and General Contractor. Sleeving may be installed by others.

1.05 SUBMITTALS

- A. Shop Drawing Required: Proposed to meet design standards as outlined in 1.04, A, "Design and System Description." Illustrate system over base of site information including site structures, plant and landscaping features. Provide complete schedule of equipment, outlets, valves, etc. to be used. Provide typical details for installation of outlets, valves and backflow preventer.
- B. Product Data: Provide manufacturer's information and specifications for all system components proposed for use.

1.06 PROJECT RECORD DOCUMENTS

- A. Prepare record drawing of irrigation system with accurate locations of sleeving, piping, outlets, valves, drains, and other system components.

1.07 OPERATION AND MAINTENANCE DATA

- A. Furnish to Owner instructions for operation and maintenance of system and controls, seasonal activation and shutdown, and manufacturer's parts catalog.
- B. Furnish to Owner schedule indicating length of time each valve zone is required to be open to provide appropriate amount of water for normal watering schedules.

1.08 REGULATORY REQUIREMENTS

- A. Conform to applicable plumbing codes for piping and component requirements.
- B. Provide certificate of compliance from local authority indicating approval of piping and backflow preventer installation.

1.09 FIELD MEASUREMENTS

- A. Verify that field conditions are as shown on shop drawings and base sheets. Revise for record drawing as required.

1.10 EXTRA MATERIALS

- A. Furnish to Owner the following extra components:
 1. Two sprinkler heads of each type and size.
 2. Two nozzle inserts for each type and size.
 3. Two keys each for valve boxes and controller.
 4. Two of any required special tools for adjustment or replacement of each type of outlet, nozzle, valve, and other system equipment.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. RAINBIRD by Rain Bird Sales Inc., Turf Division, or approval equal.

2.02 MATERIALS

- A. Pipe: PVC in accordance with ASTM D 2241: PVC 1120-1220, Schedule 40 main line upstream from control valves: PVC 1120-1220 class 200 pipe downstream; solvent-weld sockets.
- B. Fittings: Type and style of connection to match pipe.
- C. Solvent Cement: ANSI/ASTM D 2564 for PVC pipe and fittings.
- D. Sleeve Materials: 6-inch Schedule 40 PVC pipe.

2.03 OUTLETS

- A. General: High impact plastic, plastic housed stainless steel, brass or bronze construction types.
- B. Stream Rotor Type Outlets: Pop-up type with filter screens and internal check valves; adjustable for arc coverage and radius of throw; outlet and nozzle type matched for coverage conditions. Shrub type heads are mounted on fixed riser assemblies.
- C. Spray Type outlets: Pressure regulating pop-up type head with internal check valves full circle, part circle, rectangular, fixed arc, or adjustable patterns and adjustable radius of throw. Turf area outlets to be 6" pop-up height. Shrub area placements to be 12" pop-up height to spray over plants. Shrub area placements associated with large shrubs to be on 6" pop-up outlets and designed to water small groups of shrubs at ground level.
- D. Bubbler: Adjustable outlet and pop-up head or fixed riser assembly.

2.04 VALVES

- A. Master valve: Electric solenoid; plastic or fiberglass housed stainless steel, brass or bronze construction; female thread; globe or globe/angle type valve. Flow and operating pressure ranges as follows:
 - 1. Flow: 1" valves, 0.5-50 gpm; 1-½" valves, 20-150 gpm; 2" valves, 50-200 gpm.
 - 2. Operating Pressure: 20-200 PSI.
 - 3. Size for maximum pressure loss of 5 PSI for designed flow rate.
- B. Control Valves: Flow control; electric solenoid; plastic or fiberglass housed stainless steel, brass or bronze construction; male or female thread; globe type valve. Flow and operating pressure ranges as follows:
 - 1. Flow: : 1" valves, 0.5-50 gpm; 1-½" valves, 20-150 gpm; 2" valves, 50-200 gpm.
 - 2. Operating Pressure: 20-200 PSI.
 - 3. Size for maximum pressure loss of 5 PSI for designed flow rate.
- C. Backflow Preventers: Wilkins/Zurn model 975XL, or equal, sized for maximum flow in system with a maximum pressure loss limited to 10% of available static pressure.
- D. Water Meter: Sized for maximum flow in system with a maximum pressure loss limited to 10% of the available static pressure.
- E. Valve Boxes and Covers: High impact plastic.
- F. Drain Valves: Manual, plastic, brass, or bronze for low points in system.

2.05 CONTROLS

- A. Controller: Automatic controller for electric valves with internal transformer,

solid state electronics, temporary override feature to bypass cycle for inclement weather, station capacity sized according to system with master valve circuit. Programmable for 14 day watering cycles with 3-60 minute intervals, automatic start, and shutdown.

- B. Controller Housing: Plastic or steel, weatherproof, with lockable access door.
- C. Accessories: include required fittings, galvanized metal electrical conduit, and accessories for installation.
- D. Wire: Color coded and properly sized for length of runs to valves with waterproof connectors.
- E. Rain Sensor: Automatic, debris proof, adjustable shutoff device to disable/delay operations during or recently after rainfall.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Verify location of existing utilities. Repair utilities damaged as a result of this work at no increase in Contract Sum.
- C. Verify that required utilities are available in proper location and ready for use.
- D. Beginning of installation means installer accepts existing conditions.

3.02 PREPARATION

- A. Provide service tap to water source and installation of water meter.
- B. Layout and stake locations of system components.
- C. Review layout requirements with other affected work. Coordinate locations of sleeves under paving to accommodate system. Notify Architect/Engineer for approval of field changes to system design.
- D. Coordinate with owner, Architect/Engineer, and electrical contractor for location of controller and connection to power source.

3.03 TRENCHING

- A. Minimum Trench Depth: 12 inches for irrigation lines.
- B. Trench to accommodate grade changes and slope to manual drain valves at low points in system.
- C. Maintain trenches free of debris, material, or obstructions that may damage pipe.

3.04 INSTALLATION

- A. Install and bed sleeves under pavement crossings in accordance with specifications of local governing authority for backfill and bedding.
- B. Install pipe, backflow preventer, valves, controls, and outlets in accordance with manufacturer's instructions.
- C. Provide 12" diameter by 24" deep, gravel filled drain sump at each manual drain valve location.
- D. Connect to water and electrical service.
- E. Set sprinkler heads and box covers at finish grade elevations.
- F. Provide for thermal movement and thrust blocking of components in system.

- G. Use threaded nipples for risers to each outlet to facilitate replacement.
- H. Install control wiring. Provide 10-inch expansion coil at each valve and at 100 feet intervals. Bury wire beside pipe. Mark valves with installed valve boxes and covers containing locking device. Enclose control wiring in electrical conduit from controller to wire burial depth. Paint exposed conduit to match building.
- I. Install automatic controller. Provide hardwired connection to power source, enclose wiring to system and power source in rigid metal conduit where exposed. Coordinate location connection to power source, and wiring route with Owner, Architect/Engineer and contractor. Paint exposed conduit to match building exterior.
- J. Install rain sensor device wire to controller. Coordinate location and wiring route with Owner, Architect/Engineer, and contractor. Enclose all wiring in rigid metal conduit where exposed. Paint exposed conduit to match building exterior.
- K. After piping is installed but before sprinkler heads are installed and trenches backfilled, open valves and flush system with full head of water.
- L. Repair or replace any other work or improvements damaged as a result of work related to system installation at no increase to the Contract Sum.

3.05 FIELD QUALITY CONTROL

- A. Prior to backfilling, cap or plug outlet pipes and test system for leakage. Maintain 100 psi pressure for one hour. System acceptable if no leakage or loss of pressure occurs during test period.

3.06 BACKFILLING

- A. Backfill sleeve trenches under pavement crossings and compact to sub grade elevation in accordance with site specifications for sub grade preparation. Protect piping from displacement.
- B. Backfill and compact all pipe trenches to prevent settlement.

3.07 ADJUSTING

- A. Adjust control system to achieve time cycles required for adequate watering.
- B. Change or adjust heads and/or nozzles to achieve proper coverage and performance with a minimum of over spray on to paved surfaces, buildings, and other sprinkler zone areas.

3.08 DEMONSTRATION

- A. Provide system demonstration to Owner and Architect/Engineer for final acceptance.
- B. Instruct Owner personnel in operation and maintenance of system, including adjusting of sprinkler heads. Use operation and maintenance material as basis for demonstration.
- C. Submit record drawing of system indicating any changes to final layout and show locations, sizes, types, etc. of all system components.
- D. Submit required extra materials (parts) as specified.

3.09 INSTALLER'S FIELD SERVICES

- A. Provide one complete spring startup and a fall shutdown.

3.10 WARRANTY

- A. Provide one year materials and workmanship warranty on all system components and installation beginning on date of acceptance of the work.
- B. Replace failed components immediately upon notification by Owner or Architect/Engineer.

END OF SECTION

SECTION 02920 LAWNS AND GRASSES

PART 1 GENERAL

1.1 SUMMARY

Fine grade all areas not covered by buildings or structure, paving or planting areas or otherwise designated. Furnish and install seeding, sprigging, soil supplements, and accessories as specified. Accomplish maintenance and turf establishment as specified. In the event construction prevents planting of the Bermuda grass turf areas during the specified seeding season, apply an approved temporary erosion control method to stabilize soil until Bermuda grass is established in specified seeding season.

Section Includes:

- Preparation of topsoil.
- Placing topsoil, soil amendments, mulch, and fertilizer.
- Sprig, Turfgrass SOD, Hydroseeding and Hydromulching.
- Maintenance.

Related Sections:

- Section 02200 – Earth Work
- Section 02812 - Landscape Irrigation System Performance

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AGRICULTURAL MARKETING SERVICE (AMS)
AMS-01 Federal Seed Act Regulations Part 201

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM C 602 Agricultural Liming Materials
- ASTM D2944 Standard Test Method of Sampling Processed Peat Materials
- ASTM D2973 Standard Test Method for Total Nitrogen in Peat Materials
- ASTM D2974 Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils
- ASTM D2976 Standard Test Method for pH of Peat Materials
- ASTM D2977 Standard Test Method for Particle Size Range of Peat Materials for Horticultural Purposes
- ASTM D2978 Standard Test Method for Volume of Processed Peat Materials
- ASTM D2980 Standard Test Method for Volume Weights, Water-Holding Capacity, and Air Capacity of Water-Saturated Peat Materials
- ASTM D4427 Standard Classification of Peat Samples by Laboratory Testing
- ASTM D 4972 Standard Test Method for pH of Soils

ASTM D 5268 Standard Specification for Topsoil Used for Landscaping Purposes

ASTM D5883 Standard Guide for Use of Rotary Kiln Produced Expanded Shale, Clay or Slate (ESCS) as a Mineral Amendment in Topsoil Used for Landscaping and Related Purposes

FEDERAL SPECIFICATIONS (FS) GENERAL SERVICES ADMINISTRATION, Federal Supply Service Bureau, 470 L'Enfant Plaza, S.W. Washington, DC 20407

FS O-F-241 Fertilizers, Mixed, Commercial.

FS JJJ-S-181 Seeds, Agricultural

STAFF OF THE L.H. BAILEY HORTORIUM, CORNELL UNIVERSITY

HORTUS THIRD A Concise Dictionary of Plants Cultivated in the United States and Canada - Reference of botanical plant names.

1.3 DEFINITIONS

Noxious Weeds: Bentgrass (*Agrostis spp.*), Bindweed (*Convolvulus spp.*), Bromegrass (*Bromus spp.*), Dodder (*Cuscuta sp.*), Ground Ivy (*Glechoma hederacea*), Johnson Grass (*Sorghum halepense*), Leafy spurge (*Euphorbia esula*), Nimblewill (*Muhlenbergia shreberi*), Nutgrass or nutsedge (*Cyperus spp.*), Perennial Sorrel (*Oxalis spp.*), Perrenial Sowthistle (*Sonchus arvensis*), Poison Ivy (*Toxicodendren Radicans*), Russian Knapweed (*Centaurea picris*), Quackgrass (*Agropyron repens*), Thistle (*Cirsium spp.*), Whitetop (*Lepidium draba*, *Lepidium repens*, *Hymenos-physa pubescens*), and Wild Garlic (*Allium vineale*).

Weeds: Annual Bluegrass (*Poa annua*), Tall fescue (*Festuca eliator*), Barnyardgrass (*Echinochloa crus-galli*), Blackberry (*Rubus spp.*), Burclover (*Medicago hispida*), Crabgrass (*Digitaria spp.*), Chickweed (*Stellaria media*), Chess (*Bromus spp.*), Dallisgrass (*Paspalum dilatatum*), Dandelion (*Taraxacum officinale*), Dock (*Rumex spp.*), English Daisy, (*Bellis perrene*), Foxtail (*Alopecus spp.*), Henbit (*Lamium amplexicaule*), Horsetail (*Equisetum arvense*), Jimsonweed (*Datura stramonium*), Knotweed (*Polygonum aviculare*), Lambsquarter (*Chenopodium album*), Mallow or Cheesweed (*Malva spp.*), Morning Glory (*Cusutata spp.*), Mustard (*Sisymbrium spp.*), Plantain (*Plantago spp.*), Poison Oak (*Toxicodendren toxicarium*), Purslane (*Portulaca oleracacea*), Ragwort (*Senecio spp.*), Rush grass (*Juncus spp.*), Spotted spurge (*Euphorbia maculata*), Veronica or Speedwell (*Veronica filiformis*), and Wild Onion (*Allium canadense*).

1.4 SUBMITTALS

A. Product Data: Manufacturer's literature, including physical characteristics, application and installation instructions.

1. Equipment: Hydroseeder and Hydromulcher.
2. Fertilizer.

- B. Shop Drawings: Tagged plant locations.
- C. Samples
 - 1. Edging: 1 ft (300 mm) sample of edging including stake and staking bracket
 - 2. Topsoil: Samples taken from several locations at the source.
 - 3. Submit minimum 10oz (280 g) sample of topsoil proposed. Forward sample to approved testing laboratory in sealed containers to prevent contamination.
 - 4. Testing is not required if recent tests are available for imported topsoil.
 - a. Submit these test results to the Landscape Architect for approval.
 - 5. Soil Amendments: 5 lbs (2.26 kg) sample of each type.
 - 6. Temporary Seeding: 5 lbs (2.26 kg) sample of annual seed species and application rate
 - 7. One pound sample of mulch;
 - 8. 5 lbs (2.26 kg) sample of fertilizer.
- D. Quality Control/Assurance Submittals:
 - 1. Test Reports
 - a. Results of soil analysis for existing and imported topsoils with recommended soil amendments. Provide analysis of topsoil fill under provisions of Section 01400.
 - 1) Analyze to ascertain textural class, particle size, percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.
 - b. Seed. Classification, botanical name, common name, percent pure seed, minimum percent germination and hard seed, maximum percent weed seed content, and date tested.
 - c. Package standard products with manufacturer's certified analysis.
 - d. Fertilizer: For chemical analysis, composition percent.

- e. For other material provide analysis by a recognized laboratory, made in accordance with methods established by the association of official Agricultural Chemists.
- 2. Certificates: Prior to the delivery of materials, certificates of compliance attesting that materials meet the specified requirements.
 - a. Submit shipping tags to Landscape Architect upon delivery of materials.
 - b. Department of Agriculture certificates from the state or point of origin (or purchase) declaring that the material is alive, in good health and free from insects and disease.
 - c. Arkansas Code §2-16-210 Plant Board Inspection and Certificate for Plant Materials and Products. Inspection certificates complying with all local, and federal regulations.
- 3. Sprigs: Cultivar name, genetic purity and field location.
- 4. Topsoil: article size, pH, organic matter content, textural class, soluble salts, chemical and mechanical analyses.
- 5. pH Adjuster. Calcium carbonate equivalent and sieve analysis.
- 6. Fertilizer: Chemical analysis and composition percent.
- 7. Agricultural Limestone: For calcium carbonate equivalent and sieve analysis.
- 8. Peat: For compliance with ASTM D2980 AND D4427.
- E. Qualification Statements
 - 1. Turfgrass Grower supplier:
Submit evidence of experience.
 - 2. Landscape Contractor:
Submit evidence of experience.
- F. Delivery Schedule

Delivery schedule, at least 14 days prior to the intended date of the first delivery.

1.5 QUALITY ASSURANCE

- A. Qualifications

1. Sprig Producer: Company specializing in turfgrass sprig propagation with five years documented experience.
 2. Seed Producer: Company specializing in turfgrass seed propagation with five years documented experience.
 3. Installer: Company specializing in turfgrass and plant installation with five years documented experience.
- B. Provide seed mixture in containers showing percentage of seed mix, origin of seed, year of production, percent germination, net weight, testing date, date of packaging, and location of packaging.
- C. Regulatory Requirements
- Comply with regulatory agencies for fertilizer and herbicide composition.
- D. State Regulatory Requirements - Comply with Arkansas Code Annotated (ACA)
1. §2-16-210 Plant Board Inspection and Certification
 2. §2-16-401 Pesticide and Pesticide Disposal
 3. §2-21-101 Nursery Fraud and License
 4. §17-25-101 Contractor Licensing
 5. §20-20-201 Pesticide Application License
- E. Inspections, Permits, And Fees
1. Contractor
 - a. Obtain and pay for all required permits, and inspections in connection with this work under the Contract.
 - b. Deliver to the Owner a copy of each certificate of approval from each inspection agency.
 - c. Pay for required testing.
 - d. Pay any and all fees in connection to all utilities and pay all utilities bills during construction.
 - e. Bear all costs of correcting deficiencies of any work that does not comply with the requirements of the applicable building codes, state laws, local ordinances, industry standards, and utility company regulations.

2. Testing Facilities

- a. An approved commercial testing laboratory; or
- b. Facilities furnished by the Contractor.
- c. DO NOT perform any work requiring testing until the facilities have been inspected and approved by the Landscape Architect.
- d. The first inspection of the testing facility is at the expense of the Owner.
- e. Required subsequent inspection because of first inspection failure is the expense Contractor at no additional cost to the Owner.

1.6 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling, and Unloading:

- 1. Deliver, store, protect, and handle products to site under provisions of Section 01500.
- 2. Provide delivery schedule at least 10 days prior to delivery.
- 3. Protect sprigs during shipping, handling and delivery to prevent desiccation, internal heat buildup, or contamination.
 - a. DO NOT damage sprigs during packing, handling and unloading.
 - b. DO NOT drop or dump materials from vehicles.
- 4. Deliver grass seed mixture in the original, unopened containers. Seed in damaged packages is unacceptable.
- 5. Deliver fertilizer in the original, unopened waterproof bags showing weight, chemical analysis, and name of manufacturer. Fertilizer in damaged packages is unacceptable.
- 6. Deliver soil amendments in the original, unopened containers bearing the manufacturer's chemical analysis. Soil amendments in damaged packages is unacceptable.
- 7. Soil amendments may be furnished in bulk.
- 8. Provide a chemical analysis for bulk deliveries.

B. Acceptance at Site

1. Inspect sprigs for:
 - a. conformity to cultivar and genetic purity;
 - b. attached roots with 2 to 3 nodes;
 - c. 4 to 6 in (100 to 150 mm) in length, with no adhering soil, weed stems, or roots.
 - d. Reject sprigs exposed to excessive heat or drying.
2. Inspect seed for:
 - a. conformity to cultivar and quality.
 - b. Conform to FS JJJ-S-181.
 - c. Weed seed less than 1 percent by weight of the total mixture.
 - d. Maximum 1 percent by weight other crop and/or inert seeds.
 - e. Restricted noxious weeds not to exceed 90 per pound.
 - f. Free of prohibited noxious weeds.
3. Reject wet, moldy, or damaged seed .
4. Reject seed that is wet, moldy, or bears a test date 5 months or older,
5. Reject sprigs harvested over 24 hours prior to planting.
6. Reject seed held in the slurry for more than 24 hours prior to hydroseeding.
7. Inspect other materials compliance.
 - a. Reject
 - 1) open soil amendment containers or wet soil amendments;
 - 2) topsoil containing slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 1-1/2 in (40 mm) diameter
 - 3) topsoil containing viable plants and plant parts.

- 4) topsoil containing toxic substances, or other materials harmful to plant growth.
8. Remove unacceptable materials from the job site.
- C. Storage and Protection
 1. Store materials in areas designated by the Landscape Architect.
 2. Sprigs (N/A):
 - a. Store in designated areas and cover with moist burlap, straw, or other covering.
 - b. Use covering that allows air circulation to prevent internal heat build-up.
 - c. Protect from exposure to wind, and direct sunlight until installed.
 3. Store seed, lime, and fertilizer in cool, dry [designated] locations away from contaminants.
 4. Store chemical treatment material according to manufacturer's instructions separate from plant material or other materials.

1.7 PROJECT/SITE CONDITIONS

Existing Conditions: For existing topsoil condition see the soil report. Contractor shall contact the local agricultural extension office and submit soil sample to determine if any amendment to the existing top soil is required. Submit the Test results to the Project Engineer.

1.8 SCHEDULING

- A. Coordinate the work of this Section with installation of underground sprinkler system piping and watering heads, installation of exterior plants and installation of site furnishing to prevent damage to plants and planting areas.
- B. Coordinate with the installation of other site work by other contractors.
- C. Planting Coordination: Plant trees, shrubs, groundcovers and vines after final grades are established and before planting of turf unless otherwise approved by the Landscape Architect. If planting of trees and shrubs occurs after turf installation, protect the lawn areas, and promptly repair damage which occurs.

1.9 WARRANTY

- A. Provide one year replacement warranty including one continuous growing season under provisions of Section 01700 including coverage of lawns or grass areas for death or unhealthy conditions. All turfgrass shall be uniform in color and care coverage, leaf texture and shoot density, reasonably free of weeds, diseases and other visible imperfections at acceptance.
- B. Replacements: Lawn or grass area of same size and species as specified, planted in the next growing season, with a new warranty commencing on date of replacement.

1.10 MAINTENANCE

Maintain installed lawn immediately after placement until grass is well established and exhibits a vigorous growing condition for two cuttings.

PART 2 PRODUCTS

2.1 GROWERS AND SEED PRODUCERS

- A. Advanta Seeds Pacific. Inc., 33725 Columbus Street, Albany, Oregon 97321-0452, (800) 266-7333
- B. Barenbrug USA, 33477 Highway 99E, Tangent, Oregon 97389 (541) 926-5801
- C. Ernst Conservation Seeds, 9006 Mercer Pike, Meadville, Pennsylvania 16335, (800) 873-3321
- D. Georgia Coastal Plains Experimental Station, Tiffin, Ga.
- E. Lofts Incorporated, Bound Brook, New jersey 08805 (800) 526-3890
- F. Lofts Affiliate, Sunbelt Seeds, Incorporated, 5172 Indian Trail, Industrial Parkway, Suite A, Norcross, Georgia 30093, (404) 448-9932
- G. Kansas Agricultural Experiment Station, Manhattan, Ks.
- H. Pennington Seed Company, P.O. Box 290, Madison, Georgia 30650, (800) 285-7333
- I. Sunmark Seeds International, 503 NW Irving Street #200a, Portland, Oregon 97209 (503) 241-7333
- J. The Scotts Company, 41 South High Street. Suite 3500, Columbus, Ohio 43215, (614) 719-5500, <http://www.scottscompany.com>.

- K. Quail Valley Farm, Inc.. Little Rock, Arkansas.
- L. Winrock Grass Farm, Inc.. Little Rock, Arkansas.
- M. Substitutions: Under provisions of Section 01600.

2.2 SPRIGS (N/A)

- A. 100 percent healthy living stems, stolons or rhizomes of *Cynodon dactylon* 'Tifway T-419' (Tifway Hybrid Bermuda grass) with attached roots from 4 to 6 inches (100 to 150 mm) long and 2 to 3 nodes.
- B. Sprig species comply with HORTUS THIRD.
- C. Grown under climatic conditions similar to those in the locality of the project.
- D. Without adhering soil, weed stems, or roots.
- E. Obtained from heavy and dense sod, and free from material detrimental to a healthy stand of grass plants.
- F. Protected from excessive heat or drying.

2.3 SEED

- A. Provide state-certified seed of the latest season's crop in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material.
- B. Labels shall conform to AMS-01 and applicable state seed laws.
- C. Hydroseeding Mix: Bermuda Triangle Mix or approved equal.
 - 1. *Cynodon dactylon* (Bermuda Grass 'Mohawk': 33 percent;
 - 2. *Cynodon dactylon* (Bermuda Grass 'Sultan': 33 percent;
 - 3. *Cynodon dactylon* (Bermuda Grass 'Sydney': 33 percent.
- D. Temporary Seed Species:
 - 1. *Lolium multiflorum* (Annual Rye Grass): 100 percent.

2.4 SOD/TURFGRASS

1. *Turfgrass Sod Composition:* Turfgrass sod shall consist of a dense, well rooted growth of permanent and desirable grasses, indigenous to the locality it is being placed, that is practically free from weeds or undesirable grasses. When cutting the sod, the grass should be approximately 2 inches long.

2. *Turfgrass Sod Quality:* Turfgrass sod shall be of good quality, free of weeds, disease and insects and of good color and density.

3. *Thickness of Cut:* Turf shall be machine-cut at a minimum uniform soil thickness necessary for plant viability during the Harvest-Transport-Installation cycle (at least $\frac{3}{4}$ " thick or more, depending on the nature of the sod, so that practically all of the dense root system is retained, but exposed, in the sod strip and so that handling the sod causes no undue tearing or breaking).

4. *Pad Size:* Individual pieces of turfgrass sod shall be cut to the supplier's standard width and length. Maximum allowable deviation from standard widths and lengths shall be 5 percent.

5. *Strength of Turfgrass Sod Sections:* Standard size sections of turfgrass sod shall be strong enough to support their own weight and retain their size and shape when suspended vertically from a firm grasp on the upper 10 percent of the section.

6. *Replacement:* The policy for replacement of turfgrass sod is dependent upon each individual farm. Most replacements extend only to the cost of the turfgrass sod involved, not labor or transportation expenses. Notification of defective turfgrass sod must be made within 24 hours of delivery. Failure to notify the turf farm within the specified time period can result in the farm's refusal to replace the turfgrass sod.

2.5 SUBSTITUTIONS

Substitutions are not be allowed without written request and approval of Landscape Architect.

2.6 SOIL MATERIALS

- A. Topsoil: Excavated from site and free of weeds.
- B. Imported Topsoil: Imported, ASTM D 4972 and D 5268, fertile, friable, clean, rich, dark, surface, agricultural soil (loamy sand, sandy loam, clay loam or sandy clay loam), approved by the Landscape Architect, capable of sustaining vigorous plant growth; secured from a well drained arable site with minimum topsoil depth of 4 in (10 cm); containing a minimum 4% and a maximum of 25% of decayed organic matter (humus) ; reasonably free of subsoil, clay, stones, earth clods or impurities, plants, weeds, sticks, roots, or toxic substances or any other material harmful to plant growth. Minimum pH 5.4 and maximum 7.0. Maximum soluble salts 600 ppm (or 4 mmhos). Mix and test random samples of the topsoil as a composite in accordance with standard practices. Process the testing through the

County Extension Office or approved independent laboratory. Provide test results to the Landscape Architect. Determine amendments required from the test results. Contractor will pay for sampling and testing. If needed, amend topsoil to adjust Ph.

1. River sand is NOT acceptable.
2. DO NOT obtain from bogs, marshes or steep clayey slopes.
3. DO NOT strip, collect or deposit topsoil while soil is wet.
4. DO NOT deliver topsoil in a frozen or muddy condition.

2.7 SOIL AMENDMENTS

pH adjusters, fertilizer, organic material, and soil conditioners meeting the following requirements.

- A. DO NOT use vermiculite.
- B. pH Adjuster: an agricultural liming material in accordance with ASTM C 602 (i.e. burnt lime, hydrated lime, ground limestone, or shells. The pH adjuster shall be used to create a favorable soil pH for the plant material specified.
 1. Ground Limestone: ground agricultural limestone.
 - a. Minimum calcium carbonate equivalent of 90 percent.
 - b. Minimum 90 percent passing a #10 (2 mm) sieve.
 - c. Minimum 50 percent passing a #60 (0.250 mm) sieve.
 2. Hydrated Lime:
 - a. Minimum calcium carbonate equivalent of 110 percent.
 - b. Minimum 100 percent passing a #8 sieve (2.36 mm).
 - c. Minimum 97 percent passing a #60 sieve (0.250 mm).
 3. Burnt Lime
 - a. Minimum calcium carbonate equivalent of 140 percent.
 - b. Minimum 95 percent passing a #8 sieve (2.36 mm).
 - c. Minimum 35 percent passing a #60 sieve (0.250 mm).
 4. Soil sulphur (Flowers of sulphur):
 - a. Minimum 90 percent passing a #10 (2 mm) sieve.
 - b. Minimum 50 percent passing a #60 (0.250 mm) sieve.

5. Aluminum sulfate:
 - a. Minimum 90 percent passing a #10 (2 mm) sieve.
 - b. Minimum 50 percent passing a #60 (0.250 mm) sieve.
6. Ferrous sulphate:
 - a. Minimum 90 percent passing a #10 (2 mm) sieve.
 - b. Minimum 50 percent passing a #60 (0.250 mm) sieve.
- C. Fertilizer: FS O-F-241, Type I Grade A controlled release commercial grade, free flowing, uniform in composition, and consist of a nitrogen-phosphorus-potassium ratio derived from sulphur coated urea, urea formaldehyde, plastic or polymer coated pills, or isobutylene diurea (IBDU)] recommended for grass, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil as indicated in analysis.
- D. Greensand: a potash-based exchange mineral, commercially packaged and free flowing.
 1. Minimum 7 percent total potash.
 2. Minimum 1 percent phosphorous.
 3. Minimum 22 percent trace minerals.
- E. Rock Phosphate
 1. Contain a minimum of 18-30 percent phosphorous.
 2. Minimum of 3 percent initial availability.
 3. Commercially packaged and free flowing.
- F. Organic Material: peat, bonemeal, rotted manure, decomposed wood derivatives, recycled compost, or worm castings.
 1. Peat: A natural, granulated, or shredded commercial Sphagnum Peat Moss or Peat Humus derived from a bog, swampland or marsh, containing not more than fifteen (15) percent decomposed organic matter by weight, low in content of woody material, free of materials harmful to plant life; with a pH of from 4 to 6, a moisture content of not over 30% and a moisture absorbing capacity from 1100% to 2000%.
 2. Bonemeal: finely ground, steamed bone product, containing from 2 to 4 percent nitrogen and 16 to 40 percent phosphoric acid.

3. Rotted Manure: unleached horse, chicken, or cattle manure, heat treated to kill weed seeds, containing a maximum 25 percent by volume of straw, sawdust, or other bedding materials, free of stones, sticks, soil, and toxic substances harmful to plants.
 4. Compost: Commercially produced stable humus mixture of well aerobically decomposed, stable, weed free organic matter source derived from food, agricultural, or industrial residuals; biosolids (treated sewage sludge); yard trimmings; or source-separated or mixed solid waste free of objectionable odors and toxic substances harmful to plants
 - a. cleaned of all plastic materials;
 - b. composted for a minimum of five weeks;
 - c. one to three percent nitrogen, phosphorus, and potassium;
 - d. pH 5.5 to 8.0;
 - e. 35 - 55% moisture content by weight;
 - f. maximum one percent man-made material;
 - g. no glass or metal shards;
 - h. Screened
 1. 100% passing a 3/8 in (10 mm) screen
 2. Minimum 95% by weight less than 1/4 inch (6 mm) diameter.
 3. maximum 5% greater than 1/4 inch (6 mm) diameter.
 4. maximum 65% greater than 3/64 inch (1 mm) diameter.
 5. minimum 35% less than 3/64 inch (1 mm) diameter.
 - i. fecal coliform populations less than 1,000 MPN/ gm total solids dryweight;
 - j. salmonella species populations 3 MPN/gm total solids dryweight.
 5. Worm Castings: commercially packaged, screened from worms and food source.
- G. Soil Conditioner: sand, calcined clay, or gypsum for use singly or in combination to meet the requirements for topsoil.
1. Sand
 - a. Sand shall be clean and free of toxic materials.
 - b. Gradation: A minimum 95 percent by weight shall pass a 2 mm No. 10 sieve and a minimum 10 percent by weight shall pass a 1.18 mm No. 16 sieve.

- c. Greensand shall be balanced with the inclusion of trace minerals and nutrients.
- 2. Calcined Clay
 - a. Calcined clay shall be granular particles produced from montmorillonite clay calcined to minimum temperature of 650 degrees C. 1200 degrees F.
 - b. Gradation: A minimum 90 percent passing 2.36 mm No. 8 sieve; a minimum 99 percent shall be retained on a 0.250 mm No. 60 sieve; and a maximum 2 percent shall pass a 0.150 mm No. 100 sieve.
 - c. Bulk density: A maximum 640 kilogram per cubic meter 40 pounds per cubic foot.
- 3. Gypsum: commercially packaged, free flowing, and a minimum 95 percent calcium sulfate by volume.
- 4. Expanded Shale, Clay, or Slate (ESCS): ASTM D5883.

2.7 MULCH

Free from weeds, mold, and other deleterious materials and native to the region.

A. Wood Cellulose Fiber Hydro-Mulch:

- 1. Conwed Hydro-Mulch 2000 or Silva Fiber Plus or approved equal;
- 2. Does not contain any growth or germination-inhibiting factors.
- 3. Dyed an appropriate color to facilitate visual metering during application with integral tactifier.
- 4. Composition on air-dry weight basis:
 - a. 9 to 15 percent moisture.
 - b. pH range from 4.5 to 6.0

2.8 WATER

Clean, fresh, and free of substances or material which could inhibit vigorous growth of grass.

2.9 HERBICIDE

Systemic: Glyphosate (Roundup® or Kleenup®)

2.10 ACCESSORIES

A. Stakes: Softwood lumber, chisel pointed.

B. String: Organic fiber.

C. Edging

D. MANUFACTURERS

1. Collier Metal Specialties Incorporated, 3333 Miller Park South, Garland Texas 75042, (800) 829-8225, <http://www.colmet.com>.

2. Joseph T. Ryerson and Son Incorporated, P.O. Box 8000, Chicago, Illinois 60680, (773) 762-2121].

3. ProSteel, 5121 Kaltenbrun Road, Fort Worth, Texas 76119, (800) 542-4518, <http://www.prosteel.com>.

a. Substitutions: Under provisions of Section 01600.

4. 3/16 inch x 5 inch (5 mm x 13 cm) galvanized steel edging band.

5. Pre-formed stake straps, stakes and end stakes.

6. Rust resistant painted or powder coat finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Site verification of Conditions:

1. Prior to the commencement of hydroseeding and sprigging operation, verify finished grades, and topsoil placement, finish grading, and compaction requirements are complete.

2. Verify subsoil is not frozen, muddy, excessively wet or in conditions detrimental to grading or turfgrass installation.

3. Verify sufficient time has elapsed to ensure dissipation of all toxic materials (chemicals, herbicides, pesticides, etc.) from the subsoil and topsoil.

- a. Contractor is responsible for any loss or damage to turfgrass arising from improper use of chemicals or due to failure to allow sufficient time to permit dissipation of toxic residues.
4. Verify that prepared soil base is ready to receive the work of this Section.
5. Beginning of installation means acceptance of existing site conditions.

3.2 PREPARATION

- A. Protection: Protect areas with prepared surfaces from compaction and damage by vehicular or pedestrian traffic and surface erosion.
- B. Preparation of Subsoil and Sprig, Seed Planting Bed:
 1. Prepare subsoil to eliminate uneven areas and low spots. Maintain lines, levels, profiles, and contours. Make changes in grade gradual. Blend slopes into level areas.
 2. Remove foreign materials, weeds, and undesirable plants and their roots. Remove contaminated subsoil.
 3. Eliminate all existing vegetation from seedbed by herbicide.
 - a. Spray seedbed with glyphosate herbicide following manufacturer's instructions.
 - b. Maintain seedbed bare and moist for three weeks.
 - c. Spray seedbed with second herbicide application.
 - d. Maintain seedbed bare and moist for one week following second herbicide application.
 - e. DO NOT apply seed or sprigs for at least one week after last herbicide application to allow herbicide to completely breakdown.
 - f. Scarify subsoil to a depth of 3 inch (75 mm) where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.
- C. Surface Preparation:
 1. Clear the turfgrass planting bed to a depth of 4 inch (10 cm) of all roots, brush, wire, grade stakes, surface trash or other objects that would hinder installation or maintenance of turfgrass and other plantings.

2. Remove debris and stones over 5/8 inch (16 mm).
3. Set the prepared surface a maximum of 1 inch (25 mm) below the adjoining grade of any surfaced area.
4. Blend new surfaces to existing areas.
5. Roll prepared surface and complete by a light raking to remove debris.

3.3 SITE PREPARATION

A. Application of Soil Amendments

1. pH Adjustment:
 - a. Apply pH adjustment, fertilizer and soil conditioning at the rate recommended by the soil test.
 - b. Incorporate pH adjustment, fertilizer and soil conditioning into the soil to 6 inch (15 cm) depth as part of the tillage operation.

B. Tillage

1. Till level soil and slopes less than 33 percent (gentler than 3:1) to a minimum depth of 6 inches (150 mm). Till soil on slopes less than 33 percent (gentler than 3:1) to a minimum depth of 6 inches (150 mm). Till soil on slopes between 33 percent to 100 percent (between 3:1 and 1:1) to a minimum depth of 2 inches (50 mm) by scarifying with heavy rakes, or other method. No tilling is required on slopes 100% (1:1) and steeper, scarify with rake.
2. Use mechanical and powered tillers where soil conditions and length of slope permit.
3. Maintain drainage patterns indicated on drawings.
4. Completely pulverize areas compacted by construction by tilling.
5. Repair surface erosion or grade deficiencies with topsoil.
6. The pH adjustment, fertilizer and soil conditioner may be applied during tilling.

C. Placing Topsoil

1. Scarify areas to receive topsoil to a depth of 3 inches (76 mm) to bond topsoil with subsoil.

2. Spread topsoil to a minimum depth of 4 inches (10 cm) over area to be seeded. Rake until smooth.
3. Place topsoil during dry weather and on dry unfrozen subgrade.
4. Remove vegetable matter, debris and stones larger than 5/8 inch (16 mm) in any dimension, and foreign non-organic material from topsoil while spreading.
5. Grade topsoil to eliminate rough, low, or soft areas, and to ensure positive drainage.
6. Install edging at periphery of lawn areas in as indicated on drawings to consistent depth.

3.4 INSTALLATION

- A. Prior to installing sod, seed and sprigs, repair any previously prepared surface compacted or damaged.
- B. SODDING
 1. *Moistening the Soil:* After all grading has been completed, the soil shall be irrigated within 12 to 24 hours prior to laying the turfgrass sod. Turfgrass sod should not be laid on soil that is dry and powdery.
 2. *Starter Strip:* The first row of turfgrass sod shall be laid in a straight line, with subsequent rows placed parallel to, and tightly against, each other. Lateral joints shall be staggered to promote more uniform growth and strength. Care shall be exercised to insure that the turf is not stretched or overlapped, and that all joints are butted tight in order to prevent voids, which would cause air-drying of the roots.
 3. *Sloping Surfaces:* On sloping area where erosion may be a problem, turfgrass sod shall be laid with staggered joints and secured by pegging.
 4. *Watering:* The contractor shall be responsible for watering turfgrass sod immediately during and after installation to prevent drying. It shall then be thoroughly irrigated to a depth sufficient that the underside of the new turfgrass sod pad and soil immediately below the turfgrass sod are thoroughly wet (usually 1 inch of water is needed). The general contractor shall be responsible for having adequate water available at the site prior to and during installation of the turfgrass sod.
 5. Maintenance of installed turfgrass sod: Unless stated otherwise, the

contractor shall furnish all labor material and equipment required to complete the work described herein in strict accordance with the drawings and/or terms of the contract. The general contractor shall supply adequate water to the site.

TIME LIMITATION: Duration of maintenance responsibilities by landscape contractor shall be for 30 days or until otherwise specified in writing by the owner, architect, or general contractor.

C. WATERING:

1. *First Week:* The landscape contractor shall provide all labor and arrange for all watering necessary for establishment of the turfgrass sod. In the absence of adequate rainfall, watering shall be performed daily or as often as necessary during the first week and in sufficient quantities to maintain moist soil to a depth of at least 4 inches. Watering should also be done during the heat of the day to help prevent wilting.

2. *Second and Subsequent Weeks:*

The landscape contractor shall water the turfgrass sod as required to maintain adequate moisture in the upper 4 inches of soil. Avoid application of too much water. Turfgrass sod should not be continually saturated. Depending on the sprinkler, as little as 20 to 30 minutes of water application may be sufficient; other sprinklers may require longer water application times.

D. MOWING: For bluegrass or bluegrass/fescue turfgrass sod, turfgrass height shall be maintained between 1 1/2 and 2 1/2 inches unless otherwise specified. Not more than 1/3 of the grass leaf shall be removed by the initial cutting or subsequent cuttings. For bentgrass sod, initial turfgrass height shall be maintained as specified by the grower or installer. Not more than 1/3 of the grass leaf shall be removed by the initial cutting or subsequent cuttings. Height of bentgrass turf may be gradually reduced to the desired cutting height by weekly or more frequent lowering of the mower setting as specified by the grower or installer.

E. DISCLAIMER: The landscape contractor shall not be held liable for damages to turfgrass sod caused by de-icing compounds, fertilizers, pesticides, herbicides and other materials not applied by him or her or under his or her supervision nor those caused by acts of God or vandalism.

F. GUARANTEE: The landscape contractor shall guarantee work covered by this specification.

G. Sprigging (N/A)

1. Sprig areas as indicated.
2. Sprigging Seasons:

- a. Install Bermuda grass sprigs from April 15 to June 15 for spring establishment; from June 15 to August 1 for summer establishment.
 - b. Sprigging Conditions
 - c. Perform sprigging only during periods when beneficial results can be obtained.
 - d. Stop sprigging when drought, excessive moisture, or other unsatisfactory conditions prevail.
 - e. Submit proposed alternate for approval, when special conditions warrant a variance to the sprigging season or operations.
3. Use broadcast, hydrosprigging or row sprigging method and ensure even coverage.
4. Broadcast Sprigging:
 - a. Broadcast sprigs uniformly with mechanical equipment or other approved method.
 - b. Plant sprigs to provide a minimum 50 viable sprigs/square yard (60 viable sprigs/sq m).
 - c. Space sprigs a maximum 6 inches (300 mm) apart.
 - d. Force sprigs into the soil a minimum 1 inch (25 mm) depth by disk-rolling, pressing with steel matting, or other approved method.
5. Hydrosprigging:
 - a. Mix sprigs with water and hydromulch and uniformly apply under pressure over the entire area to provide a minimum 50 viable sprigs/square yard (60 viable sprigs/sq m).
 - b. Cover sprigs by distributing a topdressing of topsoil uniformly and evenly to a minimum 1 inch (25 mm) depth.
6. Mechanical Sprigging:
 - a. Plant sprigs in rows spaced a maximum 12 inches (300 mm) apart and to a minimum 1 inch (25 mm) depth, with mechanical sprig planter or other methods to provide a minimum 50 viable sprigs/square yard (60 viable sprigs/sq m).

- b. Place sprigs in the rows a maximum 6 inches (150 mm) apart.

H. Mulching

1. Wood Cellulose Fiber:

- a. Apply wood cellulose fiber mulch as part of the hydrosprigging and hydroseeding operation.
- b. Apply and mix mulch in accordance with the manufacturer's recommendations.

I. Hydroseeding

1. Hydroseed areas as indicated.

2. Hydroseeding Seasons:

- a. Hydroseed Bermuda grass from April 15 to June 15 for spring establishment; from June 15 to August 15 for summer establishment.

3. Hydroseeding Conditions:

- a. Perform Hydroseeding only during periods when beneficial results can be obtained.
- b. Stop Hydroseeding when drought, excessive moisture, or other unsatisfactory conditions prevail.
- c. Submit proposed alternate for approval, when special conditions warrant a variance to the sprigging season or operations.

4. Apply mulch/seed slurry to slopes of 33% (3:1) or less at a rate of 1500 lbs/acre (1700 kg/ha) evenly in two intersecting directions, with a hydraulic seeder.

5. Apply mulch/seed slurry to slopes exceeding 33% (3:1) at a rate of 2000 lbs/acre (2,300 kg/ha) evenly in two intersecting directions, with a hydraulic seeder.

6. Maintain clear of shrubs and trees.

7. Apply water with a fine spray immediately after each area has been hydroseeded. Saturate to 4 inches (10 cm) of soil.

J. Hydromulching

1. Apply mulch slurry to slopes of 33% (3:1) or less at a rate of 1500 lbs/acre (1700 kg/ha) evenly in two intersecting directions, with a hydraulic seeder.
2. Apply mulch slurry to slopes exceeding 33% (3:1) at a rate of 2000 lbs /acre (2,300 kg/ha) evenly in two intersecting directions, with a hydraulic seeder.
3. Mix hydromulch for a minimum of 8-15 minutes before application to activate tackifier.
4. Immediately following broadcast or mechanical row sprigging, apply mulch to a thickness of 1/8 inch (3 mm).
5. Maintain clear of shrubs and trees.
6. Apply water with a fine spray immediately after each area has been hydroseeded. Saturate to 4 inches (10 cm) of soil.

K. Rolling

1. Firm the sprigged area with a roller not exceeding 90 lbs/ft (130 kg/m) of roller width.
2. DO NOT roll slopes over 4:1 (25%).

L. Finishing

A minimum 25 percent of the installed sprigs shall extend above the ground surface upon completion of the sprigging operation.

M. Watering Sprigs

1. Begin watering sprigged and seeded areas immediately after completing sprigging operations for the day.
2. Apply water at a rate to moisten soil to minimum 1 inch (25 mm) depth.
3. Prevent run-off, puddling, wilting and over watering of adjacent areas or plant material.
4. DO NOT drive watering trucks over turf areas.

3.5 TEMPORARY SEEDING

- A. Apply seed at 10 lbs/1,000 square yards (2.3 kg/sq m.)

- B. Seed designated areas when directed or during delays affecting the hydroseeding or sprigging operation to provide quick cover to prevent erosion.
- C. Soil Amendments
 - 1. If temporary seeding areas have not been prepared with soil amendments, apply 1/2 of the required soil amendments and till the area.
 - 2. Water the area as required.
 - 3. Apply the remaining soil amendments when the surface is prepared for installing sprigs.

3.6 APPLICATION OF PESTICIDE

- A. Submit pesticide treatment plan, when application of a pesticide becomes necessary to remove a pest or disease, and coordinate with the installation pest management program.
- B. Technical Representative
 - 1. The certified installation pest management coordinator is the technical representative.
 - 2. Technical Representative shall be present at all meetings concerning treatment for pest or disease control and during treatment application.
- C. Application
 - 1. Use a state certified applicator to apply pesticides in accordance with EPA label restrictions and recommendations.
 - 2. Utilize protective clothing and equipment as specified on the pesticide label.
 - 3. Water for formulating shall only come from designated locations.
 - 4. Filling hoses shall be fitted with a backflow preventer meeting local plumbing codes or standards.
 - 5. Prevent overflow during filling operation.
 - 6. Inspect application equipment prior to each day of use for leaks, clogging, wear, or damage. Perform any repairs immediately.

3.7 REPAIR/RESTORATION

Repair existing turf areas, pavements, and facilities damaged by hydroseeding or sprigging operations to original condition at Contractor's expense.

3.8 FIELD QUALITY CONTROL

A. Site Tests, Inspection:

1. Equipment Calibration:

- a. Immediately prior to the commencement of sprigging operations, conduct calibration tests on the equipment to be used.
- b. Confirm that the equipment is operating within the manufacturer's specifications and can meet the specified criteria.
- c. Calibrate equipment a minimum of once every day during the operation.
- d. Provide the calibration test results within 1 week of testing.

2. Soil Test

- a. Test delivered topsoil, existing soil in smooth graded areas, and stockpiled topsoil in accordance with ASTM D 5268 and ASTM D 4972 to determine the particle size, pH, organic matter content, textural class, chemical analysis, soluble salts analysis, and mechanical analysis.
- b. Samples:
 - 1) Sample soil to provide a representative sample of the soil type being tested.
 - 2) Take existing soil samples at random locations on site over the entire sprig bed.
 - 3) Take stockpiled topsoil samples at different levels in the stockpile.
- c. Use tests to determine the quantities and type of soil amendments required to meet local growing conditions for the sprig cultivar specified.

B. Quantity Check

1. Retain the empty bags for materials provided in bags to record the amount used.
2. Retain the weight certificates For materials provided in bulk, the weight shall be retained as a record of the amount used.
3. Compare amount of material used with the total area covered to determine the rate of application used.
4. Compare quantity of sprigs used against the total area sprigged.
5. Adjust differences between the quantity applied and the quantity as directed.

3.9 MAINTENANCE

A. Lawn Establishment Period:

1. The establishment period begins on the first day of work under this contract and ends three months after the last day of installation operations.
2. Submit written calendar time period for the lawn establishment period.
 - a. When there are multiple lawn establishment periods describe the boundaries of the lawn area covered for each establishment period.
 - b. Modify lawn establishment period for inclement weather, shut down periods, or for separate completion dates of areas.

B. Satisfactory Stand of Grass Plants:

1. Evaluate grass plants for cultivar and health when grass plants are a minimum 1 inch (25 mm).
2. Reject stand as unsatisfactory:
 - a. If there are less than 6 grass plants /square foot (60 grass plants/sq m).
 - 1) DO NOT count the annual grass plants when annual seed is applied over the sprigs.
 - b. If there are bare spots greater than 9 inch square (230 mm square).
 - c. If the total bare spots exceed 2 percent of the total sprigged area.

C. Maintenance During Establishment Period:

1. Eradicating weeds, insects, and diseases.
 - a. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions.
 - b. Remedy damage resulting from improper use of herbicides or pesticides.
2. Protect embankments and ditches from surface erosion.
3. Maintain erosion control materials and mulch.
4. Mow, water, and fertilize to establish lawns.

D. Mowing and Trimming:

1. Baseball Field Areas:

Mow grass at regular intervals to maintain at a maximum height of 1 inch (5 cm). Do not cut more than 1/3 of grass blade at any one mowing.
2. Other Turf Areas:

Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches (65 mm). Do not cut more than 1/3 of grass blade at any one mowing.
3. Neatly trim edges and hand clip where necessary.
4. Immediately remove clippings after mowing and trimming.

E. Post Hydroseeding or Sprigging Fertilization:

1. Apply the fertilizer as recommended by soil test.
2. Provide a maximum 1 lb/1,000 square foot (8 kg/ha) of available nitrogen to the grass plants.
3. Schedule the application prior to the advent of winter dormancy.
4. DO NOT burn the installed grass plants.

F. Pesticide Treatment

Treatment for disease or pest shall be in accordance with paragraph APPLICATION OF PESTICIDE.

G. Repair

1. Repair or reinstall unsatisfactory stand of grass plants.
2. Repair eroded areas with topsoil and reinstall sprigs.

H. Maintenance Record

Submit record of each site visit describing the maintenance work performed; areas repaired or reinstalled; and diagnosis for unsatisfactory stand of grass plants.

3.10 CLEANING

- A. Keep pavements broom clean and work area in orderly condition.
- B. Promptly remove any soil brought on the surfacing by hauling operations.
- C. Keep wheels of all vehicles clean to avoid tracking soil on the surfacing of paved areas.
- D. Remove excess and waste material from the sprigged areas and dispose off site.
- E. Keep pavements broom clean and work area in an orderly condition.
- F. Clean and remove surplus materials, temporary structures, discarded materials and debris from work site.
- G. Leave stockpile area and site clean and raked, ready to receive landscaping.
- H. Leave the site in a clean, neat, orderly condition.

3.11 PROTECTION

Protect areas immediately upon completion of the sprigging or hydroseeding operation in an area against traffic or other use by erecting barricades and providing signage as required, or as directed.

3.12 INSPECTION AND ACCEPTANCE

Landscape Architect will, upon request, make an inspection to determine acceptance, after completion of installation, maintenance and warranty period.

END OF SECTION

SECTION 09300 - CERAMIC WALL TILE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and related provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SCOPE

- A. Provide ceramic tile work, complete at walls.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Joint sealants; Section 07900.

1.4 QUALITY ASSURANCE

- A. Provide ceramic tile conforming with standard grade manufacturing requirements of ANSI 137.1.

1.5 SUBMITTALS

- A. Comply with Section 01300.
- B. Product Data: Submit manufacturer's installation instructions for materials.
- C. Samples: Submit full range of color samples for each tile specified, grout, trim pieces, and accessories for Architect's selection.
- D. Certification: Furnish Master Grade Certificate for ceramic tile, signed by the manufacturer and installer.
- E. Shop Drawings: Submit shop drawings indicating materials, type of setting, and pattern and color layout.

1.6 DELIVERY AND STORAGE

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use, in accordance with manufacturer's instructions.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. American Olean is the basis of design, other manufacturers and products may be equivalent and acceptable. Any substitutions must be submitted as per Section 01300 and within 60 days of the start of construction as indicated by the date of the Notice to Proceed. The Architect shall be the judge of the equivalency and acceptability of any substitutions.

2.3 PORCELAIN WALL TILE, CT-1

- A. American Olean is specified.
- B. See Floor Finish Plans and Finish Schedule for specific tile selections.
- C. Provide other trim tile indicated or required by project conditions

2.5 PORCELAIN TILE BASE

- A. American Olean and Crossville is specified. 6" high cove base that is of the same series as the floor tile, and matching color.
- B. See Floor Finish Plans and Finish Schedule for specific tile selections.
- C. Provide other trim tile indicated or required by project conditions.

2.6 MORTAR AND GROUT MATERIALS

- A. Laticrete is specified; equivalent materials of Mapei are acceptable, or approved equal.
- B. Mortar: Factory prepared dry set portland cement mortar mix and #4237 Laticrete tile setting liquid in proportions as recommended by Laticrete.
- C. Grout: Laticrete Grout and Joint Filler and #3701 admix in proportions as recommended by manufacturer, colors as selected by Architect.
- D. Organic Adhesive: ANSI 136.1, Type 1.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions under which tile work is to be installed. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 TILE INSTALLATION

- A. General:
 - 1. Comply with ANSI standard installation specifications A108.5. Maintain minimum temperature limits and installation practices as recommended by proprietary mortar and grout materials manufacturer.
 - 2. Extend tile work in recesses to form a complete covering without interruptions. Terminate work neatly at obstructions, edges, and corners without disruption of pattern or joint alignments.
 - 3. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight, aligned joints. Fit tile closely to electrical outlets, piping, and fixtures so that plates, collars, or covers overlap tile.
 - 4. Comply with the manufacturer's instructions for mixing and installation of materials.
 - 5. Neutralize and seal substrates in accordance with mortar manufacturer's instructions.
- B. Setting Beds: Set tile by thin-set method, using specified mortar. Fill out mortar bed to thickness as required. Provide leveling coat at concrete floors where variation exceeds 1/8" in 10 ft.
- C. Jointing Pattern:

1. Ceramic Tile: Lay tile in grid pattern. Align joints. Provide uniform 1/8" joint widths. Lay out tile work and center tile fields both directions in each space. Refer to ceramic wall tile layout plans, Sheet A5.01.
- D. Placement: Comply with applicable requirements of ANSI A108.5 standards for installation, and manufacturer's instructions for materials.
- E. Grout with specified grout.

3.3 CLEANING

- A. Cleaning: Upon completion of placement and grouting, clean all tile surfaces so they are free of foreign matter.
- B. Finished Tile and Paver Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, or otherwise defective tile and paver work.

3.4 PROTECTIONS

- A. Protect installed work with Kraft paper or other heavy covering during the construction period to prevent damage and wear. Prohibit all foot and wheel traffic from using floors for at least 3 days. Before final inspection, remove protective coverings.

END OF SECTION

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SECTION 03001 - SITE CONCRETE WORK

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 WORK INCLUDED

- A. Formwork, complete with required shoring, bracing and anchorage.
- B. Control joints and expansion joints.
- C. Concrete reinforcing, complete with required supports, spacers, and related accessories.
- D. Cast-in-place concrete.

1.03 RELATED WORK

- A. Section 01410 - Testing Laboratory Services.
- B. Section 02220 - Structure Excavation & Backfill.
- C. Section 02730 - Sanitary Sewer Manholes.

1.04 QUALITY ASSURANCE

- A. Perform cast-in-place concrete work in accordance with ACI 301, unless specified otherwise in this Project Manual.
- B. Keep copy of ACI 301-99 in field office for duration of project.

1.05 TESTING AGENCY

- A. Field testing of the concrete mix will be performed by an independent testing laboratory in accordance with Section 01410.
- B. Provide free access to work and cooperate with the appointed laboratory.
- C. Tests of cement and aggregates may be performed to ensure conformance with requirements state herein.

1.06 REFERENCE STANDARDS

- A. ACI 301 - 99, Specifications for Structural Concrete.
- B. ACI Manual of Concrete Practice, Parts 1, 2, and 3.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Allowable Concrete Mix Temperatures: ACI 301 – 99 Section 4.2.2.7.
 - 1. Cold Weather: Minimum 55 degrees F.
 - 2. Hot Weather: Maximum 90 degrees F.
- B. Do not place concrete during rain, sleet, or snow unless protection is

- provided.
- C. Keep accurate thermometer in area where work is proceeding.

PART 2 - PRODUCTS

2.01 CEMENT (ACI 301-99 Section 4.2)

- A. Portland Cement: ASTM C150, Type 1.
- B. Use one brand and type of cement throughout project unless otherwise specified.

2.02 ADMIXTURES (ACI 301-99 Section 4.2)

- A. Add air entraining agent as indicated in ACI 301-99 Section 4.2.1.4.
- B. Use of accelerating admixtures such as salts, chemicals, or other foreign materials in cold weather will not be allowed. Use no other admixtures without prior approval of the Architect/Engineer.
- C. Use of set-retarding admixtures during hot weather will not be allowed.

2.03 STRENGTH (ACI 301-99 Section 1.7.4)

- A. Provide concrete of following strength: Compressive strength (28 day): 3,000 psi, except where noted otherwise in the Contract Documents.

2.04 AIR ENTRAINMENT (ACI 301-99 Section 4.2.1.4)

- A. Add air entraining agent to concrete mix for concrete work exposed to exterior.

2.05 SLUMP (ACI 301-99 Section 4.2.2.2)

- A. Contractor shall provide slump cone and test slump for each load of concrete.
- B. Minimum slump for all concrete work: 3 inches.
- C. Slump for consolidation by vibration: 4 inches maximum.
- D. Slump for slabs and consolidation other than by vibration: 5 inches maximum.

2.06 PROPORTIONS

- A. Selection of proportions for normal weight concrete: Method 1, Method 2, or Method 3, Contractor's Option.
- B. Fine aggregate shall conform to the requirements of ASTM Specifications C-33, latest edition, and shall consist of clean, fresh water sand graded uniformly to conform to Paragraph 4 of the above referenced Specification C-33.
- C. Coarse aggregate shall conform to the requirements of ASTM Specification C-33, latest edition, using standard grading size 1-1/2" to No. 4 of washed gravel or crushed stone meeting requirements above and soundness requirements of ASTM C-33.
- D. Water: Clean and free of injurious amounts of oil, acids, alkalis, organic materials, or other deleterious substances.

2.07 REINFORCING STEEL (ACI 301-99 Section 3)

- A. Reinforcing Steel: 60 ksi yield grade; deformed billet steel bars, ASTM A615;

- plain finish.
- B. Welded Steel Wire Fabric: plain type, ASTM A185; in coiled rolls, plain finish, 6x6 - W1.4 x W1.4 or 6x6 - W2.9 x W2.9 as shown on the Drawings.

2.08 ACCESSORIES

- A. Premolded expansion joint fillers: ASTM D1621, 1/2 inch thick. Refer to ACI 301-99 Section 10.2.5.

2.09 CONCRETE MIX

- A. Mix concrete in accordance with ASTM C94.
- B. Mix concrete until there is a uniform distribution of the materials and the mass is homogeneous in consistency and colors. Continue mixing for at least 1-1/2 minutes after all the ingredients are in the mixer.

PART 3 - EXECUTION

3.01 GENERAL

- A. Notify Architect/Engineer at least 24 hours before the planned time to pour concrete.
- B. Inspection:
 - 1. Ensure that excavations and form work are completed and within the allowed tolerances.
 - 2. Ensure that ice and excess water are removed, no frost is present, and that ground is not frozen.
 - 3. Check that reinforcement is secured in place.
 - 4. Verify that insulation, anchors, and other embedded items are secured in position.
- C. Install concrete work in accordance with ACI 301-99 except as amended by this section.

3.02 FORMWORK (ACI 301-99 Section 2)

- A. Obtain Architect/Engineer's review for use of earth forms. When using earth forms, hand-trim sides and bottoms, and remove loose dirt prior to placing concrete.
- B. Tolerances for Formed Services: Comply with ACI 301-99 Section 2).

3.03 FORM SURFACES PREPARATION (ACI 301-99 Section 2)

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations. Apply prior to placing reinforcing steel, anchoring devices and embedded parts. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are affected by agent.

3.04 FINISHING FORMED SURFACES

- A. Formed Surface Finishes: Provide rough form finish (ACI 301-99 Section 2) at all surfaces not exposed to view. Provide smooth rubbed finish (ACI 301-99

Section 2) at all surfaces exposed to view.

3.05 REMOVAL OF FORMS (ACI 301-99 Section 2)

- A. Do not remove forms, shores, and bracing until concrete has gained sufficient strength to carry its own weight, construction loads, and design loads which are liable to be imposed upon it. Verify strength of concrete by compressive test results.

3.06 PLACING REINFORCING

- A. Reinforcing shall be unpainted and uncoated, free from rust or scale and shall be cleaned and straightened before being shaped and in position.
- B. Position reinforcing accurately and tie securely.
- C. Support footing reinforcement on support chairs or concrete grout at maximum 3 feet on center each way to insure proper depth from bottom.
- D. Wire dowels to longitudinal bars and place top bars in perfect alignment by the use of wood templates placed 2 inches from the top of the form.
- E. Support wire mesh on support chairs, or other approved means, at no greater than three feet on center way to hold reinforcing in the center of the slab or as shown on the Drawings.
 - 1. Do not depend on lifting mesh as concrete is being poured.
 - 2. Lap sides and ends not less than one wire spacing in slabs on grade and not less than 12 inches in structural slabs.
- F. Provide 3 inches of concrete between reinforcing and the ground, unless detailed otherwise, where concrete is poured against the ground.
- G. If, after the removal of forms, concrete surfaces are to be in contact with the ground or exposed to the weather:
 - 1. Bars larger than No. 5: Protect with 2 inches of concrete.
 - 2. No. 5 bars and smaller: Protect with 1-1/2 inches of concrete.
- H. Concrete covering for any reinforcing at surfaces not exposed directly to the ground or weather: Protect with 1-1/2 inches of concrete.

3.07 PLACING CONCRETE

- A. Convey concrete from mixer to final position by method which will prevent separation or loss of material.
- B. Maximum height of concrete free fall: 60 inches.
- C. Regulate rate of placement so concrete remains plastic and flows into position.
- D. Deposit concrete in continuous operation until panel or section is completed.
- E. Do not use concrete that has set and do not re-temper or use concrete that has been mixed for more than 1-1/2 hours.

3.08 CONSOLIDATING CONCRETE

- A. Use mechanical vibrating equipment for consolidation.

- B. Vertically insert and remove hand-held vibrators at points 18 inches to 30 inches apart, inserting to within 6 inches of bottom of freshly poured concrete.
- C. Do not use vibrators to transport concrete in forms.
- D. Minimum vibrator frequencies: 6000 impulses per minute.
- E. Vibrate concrete minimum amount required for consolidation.
- F. Keep spare vibrator on hand during concrete placing operation.
- G. Make sure the concrete is thoroughly worked around the reinforcing, the embedded items, and into corners of forms.

3.09 SLABS (ACI 301-99 Section 5)

- A. Finish concrete slab surfaces in accordance with ACI 301-99 Section 5:
 - 1. Uniformly spread, screed, and float slabs. Do not use grate tampers or mesh rollers. Do not spread concrete by vibration.
 - 2. Light broom finish exterior surfaces, except exposed aggregate.
- B. Sidewalks: Finish sidewalks in accordance with Section 02510.

3.10 CURING

- A. Cure slabs: use damp method as per ACI 301-99 Section 5.
- B. Cure Walls above Grade: Use moisture-retaining coverings as approved by Architect/Engineer in accordance with ACI 308.

3.11 WELDING (ACI 301-99 Section 3)

- A. Welding Reinforcing Steel: Not allowed.

3.12 CONSTRUCTION JOINTS

- A. Install construction joints in accordance with ACI 301-99 Section 5

3.13 INSERTS, EMBEDDED PARTS AND OPENINGS

- A. Provide formed openings where required for pipes, conduits, sleeves and other work to be embedded in and passing through concrete members.
- B. Coordinate work of other sections and cooperate with trade involved in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

3.14 REPAIR OF SURFACE DEFECTS (ACI 301-99 Section 5.3.7)

- A. Allow Architect/Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Modify or replace concrete not conforming to required lines, detail, and elevations.
- C. Repair or replace concrete not properly placed resulting in excessive honeycombing and other defects. Do not patch, repair, or replace exposed architectural concrete except upon express direction of Architect/Engineer.

3.15 FIELD QUALITY CONTROL

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- A. Four (4) concrete test cylinders will be taken by the testing laboratory for every cu. yds., or fraction thereof, of concrete placed. Not less than one (1) set of test cylinders shall be taken for each day's pour.
- B. One (1) additional test cylinder will be taken during cold weather concreting and be cured on job site under same conditions as concrete it represents.
- C. One (1) slump test will be taken by the testing laboratory for each set of test cylinders taken and for each separate batch of concrete placed.
- D. Compression test cylinders: Test cylinders shall be cast on the project site by a representative of the testing laboratory.
1. Make cylinders according to ASTM C31.
 2. Make additional sets of test cylinders for curing under job conditions:
 - a. When it is needed to determine when to remove forms.
 - b. When to put a structure into service.
 - c. When temperature extremes are expected during the curing test period.
 3. Make test cylinders in the presence of Architect/Engineer.
 4. Properly mark prepared test cylinders and fill out the card supplied by the testing laboratory with instructions on when to make test breaks and where to send the test results.
 5. Transport in a protected condition, each set of prepared and marked test cylinders to the designated testing laboratory for curing and testing as soon as the cylinders can be transported without damage.
- E. Compression Testing Concrete Cylinders ASTM C-39: by commercial testing laboratory.
1. Cure cylinders in laboratory until time for testing.
 2. Test each set of cylinders at 7 days and 28 days after pouring.
 3. Tabulation of breakage schedule and action:

Specified strength of 3,000 psi at 28 days

	<u>Test Break</u>	<u>Action</u>
7 day	Less than 2400 psi 2400 - 3000 psi over 3000 psi	Contractor notify A/E Break 28 day cylinder Stop Testing
28 day	Less than 3000 psi	Contractor notify Architect, investigate reason for low break and report in writing to A/E.
4.	For testing cylinders for specified compressive strength other than 3,000	

- psi, see the Architect/Engineer.
- F. In Case of Low Compression Test Results:
1. Architect/Engineer will have right to order change in the mix design, costs to be borne by the contractor.
 2. Architect/Engineer will have right to order core tests of the concrete in accordance with ACI C42, or load tests of the structure, the costs to be borne by the Contractor for either test.

3.16 PROTECTION OF COMPLETED WORK

- A. During curing period, protect the concrete from damaging mechanical disturbances, water flow, loading, shock, and vibration.

END OF SECTION

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SECTION 03300 - CAST-IN-PLACE CONCRETE

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 SCOPE

- A. Provide cast-in-place concrete work, complete. Provide reinforcing steel, dowels, chairs, and accessories as specified for concrete work.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Excavation and filling, including base course and drainage fill; Section 02220.
- B. Soil treatment for termite control; Section 02285.
- C. Portland cement concrete paving; Section 02513.
- D. Furnishing of structural steel base-plates, anchor rods and other metal accessories for insertion in concrete work; Section 05120.
- E. Joint sealants; Section 07900.

1.4 SUBMITTALS

- A. Comply with Section 01300, unless noted.
- B. Product Data: Submit manufacturer's product data for reinforcement and forming accessories, admixtures, patching compounds, curing compounds, and others materials as requested by Architect.
- C. Shop Drawings:
 - 1. Submit to the Architect for review prior to installation, shop drawings of all reinforcing steel, including bar cutting lists and typical bar bend diagrams.
 - 2. The Contractor shall submit electronic shop drawings for review. The Contractor shall require all shop drawings to be checked 100 percent before they are submitted to the Architect Engineer for Review. Failure to do so will result in the shop drawing being considered incomplete and rejected.
- D. Design Mix: Prior to placement of concrete, submit concrete mix designs proposed by the concrete supplier, for class of concrete, including recent test results substantiating the quality of concrete produced by each mix.
- E. Reports: Weekly reports of all compression, slump, and air content tests from the testing laboratory. Weekly reports of quality assurance test on fly ash mixture.

- F. **THE CONTRACTOR SHALL SUBMIT A POUR PLAN TWO WEEKS PRIOR TO BEGINNING ANY POURS ON THE CONCRETE SLABS, WHICH SHALL INDICATE HOW HE PLANS ON SCHEDULING THE POURS OF VARIOUS SEGMENTS OF THE FLOOR SLAB FOR THE APPROVAL OF THE ARCHITECT.**

1.5 CODES AND STANDARDS

- A. Reference Standards and Specifications: Comply with the provisions of the following specifications and standards, except as otherwise noted or specified, or as accepted or directed by the Architect during unusual climatic conditions.
1. ACI 301, "Specifications for Structural Concrete for Buildings".
 2. ACI 318, "Building Code Requirements for Reinforced Concrete".
 3. Concrete Reinforcing Steel Institute, "Manual of Standard Practice".
- B. Local Codes and Ordinances: Wherever provisions of the Standard Building Code or the local current ordinances are more stringent than the above specifications and standards, the local codes and ordinances shall govern.
- C. Concrete Testing Service: Engage a testing laboratory acceptable to Owner and Architect to perform material evaluation tests and to design concrete mixes.
1. Tests, including retesting of rejected materials for installed work, shall be paid for by the Contractor. Testing requirements are specified in Field Sampling and Testing paragraph.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. For Exposed Finish Concrete: Plywood, metal, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces.
- B. For Unexposed Finish Concrete: Use plywood, lumber, metal, or other acceptable material. If lumber is used, it must be dressed on at least 2 edges and 2 sides for a tight fit.
- C. Form Coatings: Commercial formulation form coating compound with maximum VOC of 350 mg/l that will not bond with, stain, nor adversely affect concrete surfaces, will not impair subsequent treatments of concrete surfaces.
- D. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units that will leave no metal closer than 1-1/2" to exposed surface.
1. Provide ties that, when removed, will leave holes not larger than 1" diameter in concrete surface.

2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615 deformed billet steel of grades indicated on struc-

tural drawings, free from loose rust, scale and other coatings that may reduce bond.

- B. Mesh or Fabric. Reinforcement: ASTM A 185, welded wire fabric, of sizes and types as indicated on the drawings.
- C. Supports For Reinforcement: Bolsters, chairs, spacers, ties, and other devices necessary for -properly spacing and fastening reinforcement in place, including rebars on grade.
 - 1. For rebars-on grade, use supports with sand plates or horizontal runners.
- D. For footings, support reinforcing steel with wire, metal chairs, bolsters or other approved devices; do not use bricks or stones.

2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I/II.
- B. Aggregate: ASTM C 33, and as specified.
 - 1. Fine Aggregate: Clean, Sharp, natural or manufactured sand, free from loam, clay, lumps, or other deleterious substances.
 - 2. Coarse Aggregate: Clean, uncoated, processed, locally available aggregate,
containing no clay, mud, loam or foreign matter; maximum size of 1-1/2".
Maximum size of 1" in vault slabs and walls.
- C. Mixing Water: Clean, free from oil, acid, salt, injurious amounts of vegetable matter, alkalies, and other impurities; potable.
- D. Admixtures: Provide admixture manufacturer's written certification of no chloride ion content.
 - 1. Air Entrained Admixture: ASTM C 260.
 - 2. Water Reducing or Water Reducing and Retarding ASTM C494.
 - 3. Other Admixtures:- Do not use other admixtures unless accepted in writing by Architect.
- E. Miscellaneous Materials:
 - 1. Connectors: Provide all metal connectors required for placement in cast-in-place concrete, for the attachment of structural and non-structural members.
 - 2. Expansion Joint Filler: ASTM D 1751, non-extruding premoulded material, 1/2" thick, unless otherwise noted, composed of fiberboard impregnated with asphalt, except use ASTM D 1752, Type II, resin-bound cork for walks and other exposed areas. Sonneborn "Sonoflex F" closed cell polyurethane foam expansion joint filler is acceptable.
 - 3. Vapor Barrier: Polyethylene film, 10 mill thick Visqueen or approved equal.
 - 4. Liquid Membrane-Forming Curing Compound: ASTM C 309, Type I, Class A. Moisture loss not more than 0.055 gr./sq. cm. when applied at

200 sq. ft./gal. Conspec "Conspec Cure & Seal", L & M "L & M Dress & Seal", Sonneborn "Kure-N-Seal", Euclid "Eurocure", Master Builders "MasterKure", or approved equal.

5. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
6. Moisture-Retaining Cover: One of the following, complying with ASTM C 171; waterproof paper, polyethylene film, polyethylene-coated burlap.
7. Non-Shrink Grout: CRD-C 621, factory pre-mixed grout.
 - a. Non-Metallic: Conspec "100 Non-Shrink Grout Non-Metallic", Master Builders "Set Grout", Sonneborn "SonogROUT", Euclid "Euco-NS", or L & M Crystex".
8. Bonding Agent: Polyvinyl acetate, rewettable type; W.R. Grace "Daraweld C", Sonneborn "Sonocrete", Larsen "Weldcrete", Euclid "Euroweld", or L & M "Everbond".
9. Patching Mortar: Free-flowing, polymer-modified cementitious coating; Euclid "ThinCoat", Sika Chemical "Sikatop 120", Thoro Thoro Underlayment", or Sonneborn "Sonoflow".

2.4 PROPORTIONING OF MIXES

- A. Strength: Concrete minimum ultimate strength at 28 days as noted on structural drawings.
- B. Mix Designs:
 1. Prepare design mixes for each type of concrete, in accordance with ACI 301 and ACI 318, except as otherwise specified.
 2. Proportion design mixes by weight for class of concrete required, complying with ACI 211, except as otherwise specified.
- C. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as approved by Architect. Laboratory test data for revised mix design and strength results must be submitted to and approved by Architect before using in work.
- D. Provide test results from concrete supplier for proposed design mix, to establish the following:
 1. Gross weight and yield per cu. yd. of trial mixtures.
 2. Measured slump.
 3. Measured air content.
 4. Compressive strength developed at 7 days and 28 days, from not less than 3 test cylinders cast for each 7- and 28-day test, and for each design mix.
 5. Submit written reports to the Architect for design mix at least 15 calendar days prior to the start of work.

2.5 ADMIXTURES

- A. Use air-entrained admixture in strict compliance with manufacturer's directions at concrete exposed to weather. Provide 5% to \pm 1% air entrainment at point of placement.
- B. Water/Cement Ratio: Concrete subjected to freezing and thawing shall have a maximum water/cement ratio of 0.50.

2.6 SLUMP LIMITS

- A. $4" \pm 1\text{-}1/2"$.

2.7 BATCHING AND MIXING

- A. Concrete shall be ready-mixed in accordance with the governing building code and with the referenced ACI 318. No hand mixing allowed.
- B. Ready-Mix Concrete:
 - 1. Comply with requirements of ASTM C 94, and as specified.
 - 2. When air temperature is between 85° F and 90° F, reduce mixing and delivery time from 90 minutes to 75 minutes, and when air temperature is above 90° F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORM WORK

- A. Coordinate installation of joint materials and vapor retarders with placement of forms and reinforcing steel.
- B. Design, erect, support, brace, and maintain formwork to support vertical and lateral loads, and static and dynamic loads that might be applied until such loads can be supported by the concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment elevations, and position.
- C. Construct forms in accordance with ACI 347, to sizes, shapes, lines and dimensions indicated, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, molding, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.
- D. Fabricate forms for easy removal without hammering or prying against the concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
- E. Provide temporary openings where interior area of formwork is inaccessible for cleanup, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous location.

- F. Chamfer exposed corners and edges 3/4" unless otherwise indicated, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- G. Preparation of Form Surfaces: Coat the contact surfaces of forms with a form-coating compound where applicable before reinforcement is placed.
- H. Provisions for Other Trades: Provide openings in concrete formwork to accommo-
date work of other trades. Determine size and location of openings, recesses, and chases from trades providing such ties. Accurately place and securely support items built in to form.
- I. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retighten forms after concrete Placement, if required, to eliminate mortar leaks.

3.2 VAPOR BARRIER INSTALLATION

- A. General: Following leveling and compaction (by vibrating sled) of granular base for slabs-on-grade, place vapor barrier with longest dimension parallel with direction of pour.
- B. Lap joints 6" and seal vapor barrier joints with manufacturer's recommended mastic and pressure-sensitive tape.

3.3 PLACING REINFORCEMENT

- A. Comply with the Concrete Reinforcing Steel Institute (CRSI) recommended practice for "Placing Reinforcing Bars" for details and methods of reinforcement placement and supports, and as herein specified.
 - 1. Avoid cutting or puncturing vapor barriers during reinforcement placement and concreting operations.
- B. Clean reinforcement of loose rust, mill scale, dirt, and other materials or coatings which reduce or destroy bond with concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers as required.
- D. Place reinforcement to obtain at least minimum coverage's indicated on drawings for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- E. Do not place bars more than 2" beyond the last leg of continuous support. Do not use supports to hold runways for conveying equipment.
- F. Install mesh welded wire fabric reinforcement in as long lengths as practicable, lapping pieces at least one mesh plus 2" but in no case less than 8". Lace splices with wire. Offset end laps to prevent continuous laps in either direction.

3.4 JOINTS AND INSERTS

- A. Joints: Provide slab and wall construction joints.
- B. Inserts: Set and build into the work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Properly locate all embedded items in cooperation with other trades, and secure in position before concrete is poured. Use setting drawings, diagrams, instructions, and directions provided by suppliers of the items to be attached thereto.

3.5 PREPARATION OF FORM SURFACES

- A. Coat contact surfaces of forms with an approved nonresidual, low-VOC, form coating compound before reinforcement is placed. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed or on rebars. Apply in compliance with manufacturer's instructions.

3.6 CONCRETE PLACEMENT

- A. Comply with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete", and as herein specified.
- B. Pre-Placement Inspection: Before placing concrete, clean and inspect formwork, reinforcing steel, and items to be embedded or cast-in. Notify other crafts in ample time to permit the installation of their work, and cooperate with them in setting such work, as required. Make sure soil treatment for termite control has been applied to drainage fill before vapor barrier and concrete are installed. Coordinate the installation of joint materials and vapor barriers with placement of forms and reinforcing steel.
- C. Notify Architect 48 hours before placing any concrete.
- D. Conveying: Convey concrete from the mixer to the place of final deposit by methods which will prevent the separation or loss of materials. Provide equipment for chuting, pumping, and pneumatically conveying concrete of proper size and design as to insure a practically continuous flow of concrete at the point of delivery and without segregation of the materials. Keep open troughs and chutes clean and free from coatings of hardened concrete. Do not allow concrete to drop freely more than 10 feet. All equipment and methods used for conveying are subject to the approval of Architect.
- E. Depositing: Deposit concrete continuously or in layers of such thickness that no concrete will be placed on hardened concrete so as to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete near or in its final location to avoid segregation due to rehandling or flowing, and displacement of the reinforcement.
- F. Placing Concrete In Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.
 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.
- G. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or derbies to smooth surface, free of humps and hollows. Do not disturb slab surfaces prior to beginning finishing operations.
 3. Maintain reinforcing in proper position during concrete placement.
- H. Cold Weather Placing: Comply with the requirements of ACI 306.
- I. Hot Weather Placing: Comply with the requirements of ACI 305. Use a water reducing or water reducing and retarding admixture.

3.7 FIELD SAMPLING AND TESTING

- A. The Owner shall employ an independent testing agency, acceptable to the Architect to perform the following test and samples.
1. Field samples shall be made and cured in accordance with ASTM C 31, for each concrete strength, at the rates indicated on the drawings.
 2. Test Cylinders as follows: one at 7 days, two at 28 days, and reserve the remaining cylinder for testing after a longer period as required by the Architect, if the 28 day tests do not meet the required strength.
 3. The taking of samples from small pours of 10 cubic yards or less may be omitted at the discretion of the Architect.
 4. Additionally, test slump every 25 cu. yds, recording location for report.
 5. When early form removal is requested, test field cured cylinders at 7 or less days to determine sufficient strength.
- B. Testing:
1. Where average strength of any group of 3 cylinders falls below the minimum compressive strength or of individual cylinder fall more than 500 psi below minimum compressive strength specified, the Architect shall have the right to require that test specimens be cut from the structure.

- Specimens shall be selected by Architect from location in structure represented by test specimen or specimens which failed.
2. Specimens shall be secured, prepared, and tested in accordance with ASTM C 42, within a period of 60 days after placing concrete.
 3. Concrete shall be considered to meet the strength requirements of this specification if it meets the strength requirements of paragraph 5.6.4 of ACI 318.
 4. Should laboratory analysis indicate that the proper concrete mix has not been used by the Contractor, all such concrete poured using the improper mix shall be subject to rejection.
 5. The cost of cutting specimens from the structure, patching the resulting holes, and making laboratory analysis shall be borne by the Contractor.
 6. The holes from which the cored samples are taken shall be packed solid with no slump concrete proportioned in accordance with the ACI 211 "Recommended Practice for Selecting Proportions of No-Slump Concrete". The patching shall have the same design strength as the specified concrete.
 7. If any of the specimens cut from the structure fail to meet the requirements outlined in paragraph 5.6.4 of ACI 318, the Architect shall have the right to require any and all defective concrete to be replaced, and all costs resulting therefrom shall be borne by the Contractor.
- C. Contractor Sampling: In addition to the slump test specified above, the Contractor shall keep a cone (mold) and rod apparatus on the job site for random testing of batches. When concrete does not meet the specified slump requirements, and when directed by the Architect, immediately perform a slump test in accordance with ASTM C 143. Concrete not meeting the slump requirements shall be removed from the job site.
- D. Inspection:
1. Verify compliance with the design documents and approved shop drawings of all rebar and WWF placement.
 2. File reports to the Architect at each phase of construction.

3.8 FINISH OF FORMED SURFACES

- A. Rough Form Finish: For formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.
- B. Smooth Form Finish: For formed concrete surfaces exposed-to-view, or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, painting or other similar system. The as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a

minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.

- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with texture matching adjacent foamed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.9 SLAB FINISHES

- A. Float Finish:
 - 1. Apply float finish to slab surfaces to receive trowel finish and other finishes specified.
 - 2. After screening, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power driven floats, or by hand-floating if area is small or inaccessible to power units. check and level surface plane to tolerances of Ff 18 - Fl 15. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to uniform, smooth, granular texture.
- B. Trowel Finish:
 - 1. Apply where exposed-to-view, and where-slab surfaces are to be covered with carpet, stain or other thin finish coating system.
 - 2. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of Ff 20 - Fl 17. Grind smooth surface defects which would telegraph through applied floor covering.
- C. Non-Slip Broom Finish: At exterior walks, pavements, and other locations as indi-
cated; specified in Section 02511.

3.10 CONCRETE CURING AND PROTECTION

The contractor should be aware that some portions of the slab are to receive stained finish and an appropriate curing material shall be used to accommodate this.

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Start initial curing as soon as free water has disappeared

from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

- B. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, or by combinations thereof, as specified.
1. Provide moisture curing by keeping concrete surface continuously wet by covering with water, by water-fog spray, or by covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. **Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.**
 2. Provide moisture-cover curing by covering concrete surface with retaining cover for curing concrete, placed in widest practicable width sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 3. Provide curing and sealing compound on interior slabs left exposed; and to exterior slabs and walks, as follows:
 - a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - b. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
- C. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- D. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs and other flat surfaces by application of appropriate curing compound. Final cure concrete surfaces to receive finish flooring by moisture-retaining cover, unless otherwise directed.

3.11 PROTECTION

- A. No wheeling, working, or walking on finished surfaces will be allowed for 16 hours after the concrete is placed.

- B. Provide plywood or other acceptable protective cover at all traffic areas throughout the job.
- C. Protect all exposed concrete floors', steps, and walks from paint and other materials or equipment which may mar or damage these surfaces.

3.12 REMOVAL OF FORMS

- A. **DO NOT REMOVE FORMS UNTIL THE CONCRETE HAS ATTAINED 67% OF 28 DAY STRENGTH OR A MINIMUM OF 4 DAYS.** Use a method Of form removal which will not cause over-stressing of the concrete.

3.13 MISCELLANEOUS ITEMS

- A. Filling Holes: Fill in holes and openings left in concrete for the passage of work by other trades after their work is in place. Mix, place, and cure concrete to blend with in-place construction. Provide all other miscellaneous concrete filling required to complete work.
- B. Non-Shrink Grout Application: Grout base plates, equipment bases and other location indicated with specified non-shrink grout. Provide non-metallic type grout.

3.14 CONCRETE SURFACE REPAIRS

- A. Repair and patch defective areas with cement mortar of the same type and class as the original concrete, immediately after removal of forms. Cut out honeycomb, rock pockets, voids over 1/2" diameter, and holes left by tie rods and bolts down to solid concrete but in no case to a depth of less than one inch. Make edges of cuts perpendicular to the concrete surface, before placing cement mortar in the same manner as adjacent concrete. Proprietary patching compounds may be used when acceptable to the Architect.
- B. Other repair methods may be used, subject to Architect's acceptance.

3.15 CLEAN-UP

- A. Do not allow debris to accumulate. Clean up all concrete and cement materials, equipment and debris upon completion of any portion of the concrete work, and upon completion of the entire cast-in-place concrete work.

END OF SECTION

SECTION 03400 - ARCHITECTURAL PRECAST CONCRETE

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 DESCRIPTION

- A. Work Included: Manufacture, deliver, erect, and install precast concrete units specified.

1.3 QUALITY ASSURANCE

- A. Furnish architectural precast concrete products complying with these specifications regarding physical requirements, workmanship, texture, and color.
- B. Manufacturer: Regularly engaged in manufacture of this type product with inspection and quality control system and capability to produce precast units at rate that will not cause delays in Project.
- C. Cast in accurate molds designed to withstand high frequency vibration.
- D. Execute mix design, casting, finishing and curing using manufacturer's standard quality controlled production methods. However, the end product of any method must comply with all the aesthetic and physical characteristics specified.

1.4 SUBMITTALS

- A. Provide sample panel 12” by 12” showing proposed texture and colors. See Section 01300 – Submittals.
- B. Shop Drawings: Submit Shop Drawings showing wall layout, details, connections, expansion joints and installation sequence.
- C. Reports, Calculations and Certificates:
 - 1. Submit, when requested, copies of selected test reports by independent laboratories verifying system performance.
 - 2. Submit, when requested, engineering calculations verifying system structural performance designed for this Project.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cement: White or grey (as required for the specified finish) Portland Cement Type I or II conforming to current edition of ASTM C-150.
- B. Fine and Coarse Aggregates: Clean hard, strong and durable inert materials, free of injurious amounts of deleterious substances complying with ASTM C-33. Use potable water.

- C. Reinforcement: Welded wire fabric with the addition of deformed reinforcing bars according to design criteria. Use galvanized deformed bars with one inch and less clearance to an exterior face.
- D. Mechanical, electrical, special equipment and anchors, metal jambs and related items for work of other trades, if required, are supplied to manufacturer for casting into units by appropriate supplier under this Contract.
- E. Anchorage devices, weld plates, inserts, wood nailers and lifting handles as furnished and securely embedded by manufacturer.

2.2 PHYSICAL QUALITIES

- A. Concrete Mix: Design to have minimum compression strength of 5000 psi at 28 days when tested in 6" x 12" cylinders complying with ASTM C-39 latest revision.
- B. Absorption: Not to exceed 5% maximum when tested complying with ASTM C-97 latest revision.
- C. Water Cement Ratio: Not to exceed 5 gallons per sack of cement.
- D. If mix designs with known test histories are used and semi-automatic batching equipment is employed, only certification of compliance to above is required. If test reports are requested by architect, same paid for by Owner.
- E. Unit Tolerances:
 - 1. Warpage: Not to exceed 1/8" per 6'-0" length of panel.
 - 2. Squareness: No panel more than 1/8" in 6 feet off square.
 - 3. Location of Anchors and Inserts: Locate plus or minus 3/8" from center line of location required.
 - 4. Blockouts and Reinforcing. Locate within plus or minus 1/4" of positions required.
- F. Reinforcing and connections shown on Drawings are adequate for normal temperature and building stresses. Manufacturer is responsible for additional reinforcing and connections necessary for fabrication, transportation, and erection stresses.
- G. Shop Drawings: Prepare by manufacturer and submitted through Contractor for review by Architect. Contractor responsible for measurements, dimensions at job site, and coordination of work by various trades and suppliers.

2.3 FINISH

- A. Exposed Exterior Panel Faces: Color texture, and exposed aggregate finish to match **Arkansas Precast Corp.** sample on file and available for inspection in office of Architect.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. If installation is not performed by manufacturer, Contractor assumes full responsibility for the work. Employ skilled supervisors and workmen experienced in this type work.
- B. Handle units in a nearly vertical plane at all times. Stack vertically and lean against proper supports until used, unless otherwise approved by manufacturer.
- C. Center in their allotted space according to approved Shop Drawings and securely bolt or weld as required.
- D. Protect units from staining during installation and after installation.
- E. Caulk joints complying with caulking specifications and details.
- F. After work is completed, repair damaged architectural precast concrete products to satisfaction of Architect, and then wash down and clean entire surface with soap and clear water, preferably from a hose.

END OF SECTION

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SECTION 04200 –CONCRETE UNIT MASONRY

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.

1.02 SCOPE:

Furnish labor and materials necessary to complete concrete masonry work as indicated.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS:

- A. Joint Sealants: Section 07900
- B. Ground Face Block: Section 04220

1.04 QUALITY ASSURANCE:

- A. Codes and Standards: Provide material and work complying with referenced codes, regulations and standards.
- B. Manufacturer: Obtain each type of unit from one manufacturer, cured by one process, and of uniform texture and color.

1.05 SUBMITTALS:

- A. Certification: Submit certification that each type of unit complies with specified requirements.
- B. Manufacturer's Data: Submit manufacturer's technical data and installation instructions for insulation material.

1.06 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver masonry materials to project in undamaged condition.
- B. Store and handle masonry units to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion and other causes.
- C. Store cementitious materials off ground, under cover and in dry location.
- D. Store aggregates where grading and other required characteristics can be maintained.
- E. Store masonry accessories including metal items to prevent deterioration by corrosion and accumulation of dirt.

1.07 JOB CONDITIONS:

- A. Protect masonry materials during storage and construction from wetting by rain, snow or ground water and from soilage or intermixture with earth or other materials. Do not use metal reinforcing or ties having loose rust or other coatings, including ice, which will reduce or destroy bond.
- B. During erection, cover top of wall with heavy waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
- C. Do not apply uniform floor or roof loading for at least 12 hours after building masonry walls or columns. Do not apply concentrated loads for at least 3 days after building masonry walls or columns.
- D. Prevent grout or mortar from staining the face of masonry to be left exposed or painted. Immediately remove grout or mortar in contact with masonry. Protect sills, ledges and projections from droppings of mortar.
- E. Do not lay masonry when the temperature of outside air is below 40EF, unless means are provided to heat and maintain temperature of masonry materials and protect completed work from freezing. Protection shall consist of heating and maintaining temperature of masonry materials to at least 40EF, and maintaining an air temperature above 40EF on both sides of masonry for at least 48 hrs.

PART 2 - PRODUCTS

2.01 CONCRETE MASONRY UNITS:

- A. General:
 - 1. Comply with referenced standards and other specified requirements for each type of masonry unit required.
 - 2. Provide special shapes where required for lintels, corners, jambs, sash, control joints, headers, bonding, cap, cove, bullnose and other special conditions.
- B. Concrete Block: Provide units complying with characteristics specified below for Grade, Type, face size, exposed face, and weight classifications.
 - 1. Grade N.
 - 2. Size: Manufacturer's standard units with nominal face dimensions of 16" long X 8" high X thicknesses indicated.
 - 3. Type I, moisture-controlled units.
 - 4. Exposed Faces: Manufacturer's standard color and texture, except where otherwise indicated or specified.
 - 5. Hollow Loadbearing Block: ASTM C 90; use normal weight block for all

work below grade and at parapet walls above conc.stem wall.

6. Curing: Cure units in a moisture-controlled atmosphere or in an autoclave at normal pressure and temperature to comply with ASTM C 90 Type I requirements.

2.02 MORTAR AND GROUT MATERIALS:

- A. Portland Cement: ASTM C150 Type I, except Type III may be used for cold weather construction.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Aggregate for Mortar: Sand, conforming to ASTM C144 or ASTM C404, Size No. 2.
- D. Aggregate for Grout: ASTM C404, Size No. 8 or Size No. 89.
- E. Water: Clean, drinkable.

2.03 MASONRY INSULATION:

- A. Provide loose-fill masonry fill insulation, full height of masonry units, in all block voids, such as RYOLEX, loose fill Perlite insulation, by Silbrico Corporation. Install as per manufacturer's recommendations. Provide in the following locations:
 1. All exterior Ground Face concrete block walls at the perimeter of interior Spaces.
 2. First Floor perimeter walls of Core 'A'.
 3. Concrete block walls at Core 'B', which surround conditioned interior Spaces.

PART-3 – EXECUTION

3.01 EXAMINATION:

Examine the areas and conditions under which masonry is to be installed. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.02 PREPARATION:

- A. CMU: Do not wet concrete masonry units.
- B. Cleaning Reinforcing: Before placing, remove loose rust, ice and other coatings from reinforcing.

3.03 CONSTRUCTION TOLERANCES:

- A. Variation from Plumb: For vertical lines and surfaces of columns, walls and arises do not exceed 1/4" in 10', or 3/8" in a story height not to exceed 20', nor 1/2" in 40' or more. For external corners, expansion joints, control joints and

other conspicuous lines, do not exceed 1/4" in any story of 20' maximum, nor 1/2" in 40' or more.

- B. Variation from Level: For lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4" in any bay or 20' maximum, nor 3/4" in 40" or more.
- C. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, do not exceed 1/2" in any bay or 20' maximum, nor 3/4" in 40' or more.

3.04 INSTALLATION, GENERAL:

- A. Thickness: Build composite/cavity walls to the full thickness shown. Build single wythe walls to the actual thickness of the masonry units, using units of nominal thickness indicated.
- B. Build chases and recesses as indicated or required for the work of other trades. Provide not less than 8" of masonry between chases or recess and jamb openings, and between adjacent chases and recesses.
- C. Leave openings for equipment to be installed before completion of masonry work. After installation of equipment, complete masonry work to match work immediately adjacent to the opening.
- D. Cut masonry units using motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to fit adjoining work neatly. Use full-size units without cutting wherever possible.

3.05 LAYING MASONRY WALLS:

- A. Lay walls plumb and true to comply with specified tolerances, with courses level, accurately spaced and coordinated with other work.
- B. Lay concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and foundation walls and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or to be filled with grout. Lay CMU in running bond with vertical joint in each course centered on units above and below.
- C. Build-in items specified under this and other sections of this specification. Fill in solidly with masonry around built-in items. Fill space between hollow metal frames and masonry solidly with mortar.
- D. Joints: Lay walls with 3/8" joints. Use mortar mix as dry as practicable and compress joints as much as possible to produce a dense tight joint.
 - 1. Concealed joints: Strike flush.
 - 2. Exposed CMU joints: Tooled

3.06 HORIZONTAL JOINT REINFORCING:

- A. Reinforce walls with continuous horizontal reinforcing. Fully embed longitudinal side rods in mortar for their entire length. Lap reinforcement a minimum of 6" at ends of units. Do not bridge control joints with reinforcing. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcing as directed by the manufacturer for special conditions. Space reinforcing 16" o.c. vertically.
- B. Reinforce masonry openings greater than 12" wide with horizontal joint reinforcing placed in 2 horizontal joints approximately 8" apart, both immediately above the lintel and below the sill. Extend reinforcing a minimum of 2' beyond jambs of the opening bridging control joints where provided.

3.07 CONTROL AND EXPANSION JOINTS:

Install vertical expansion and control joints. Build-in related items as masonry work progresses. Refer to Section 07900 for sealants.

3.08 REPAIR, POINTING AND CLEANING:

- A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of placement.
- B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up joints at corners, openings and adjacent work to provide a neat, uniform appearance, properly prepared for application of caulking or sealant compounds.
- C. Clean exposed CMU masonry by dry brushing at end of each day's work and after final pointing to remove mortar spots and drippings.

END OF SECTION

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SECTION 04210 - BRICK MASONRY

PART 1 - GENERAL

1.1 SCOPE

- A. Provide concrete masonry work, complete.

1.2 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Concrete unit masonry 04200
- B. Joint Sealants; Section 07900
- C. Water Repellant Coating 07190.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Provide material and work complying with referenced codes, regulations and standards.
- B. Manufacturer: Obtain each type of unit from one manufacturer, cured by one process, and of uniform texture and color.
- C. Field Constructed Mock-Up: Prior to installation of masonry work, erect sample wall panel to verify selections made for color and textural characteristics, under sample submittals of masonry units and mortar, and to represent completed masonry work for qualities of appearance, materials and construction; build mock-up to comply with the following requirements:
 - 1. Locate mock-up as directed by Architect.
 - 2. Build mock-up approximately 6' long by 4' high by full thickness, including face and back-up wythes as well as accessories.
 - 3. Obtain acceptance by Architect of visual qualities of mock-up before start of masonry work including "rough" concave joint. Retain mock-up and use as quality standard until work is completed. When directed, demolish mock-up and remove from site.
 - 4. Use sample panel to test proposed cleaning procedures.
 - 5. Use sample panel to test water repellent coating.

1.4 SUBMITTALS

- A. Comply with Section 01300.
- B. Certification: Submit certification that each type of unit complies with specified requirements.
- C. Shop Drawings: Submit expansion and control joint layout.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver masonry materials to project in undamaged condition.
- B. Store and handle masonry units to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion and other causes.
- C. Store cementitious materials off ground, under cover and in dry location.
- D. Store aggregates where grading and other required characteristics can be maintained.

- E. Store masonry accessories including metal items to prevent deterioration by corrosion and accumulation of dirt.

1.6 JOB CONDITIONS

- A. Protect masonry materials during storage and construction from wetting by rain, snow or ground water and from soilage or intermixture with earth or other materials. Do not use metal reinforcing or ties having loose rust or other coatings, including ice, which will reduce or destroy bond.
- B. During erection, cover top of wall with heavy waterproof sheeting at end of each day's work. Cover partially completed structures when work is not in progress. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
- C. Prevent grout or mortar from staining the face of masonry to be left exposed. Immediately remove grout or mortar in contact with masonry. Protect sills, ledges and projections from droppings of mortar.
- D. Do not lay masonry when the temperature of outside air is below 40 deg F, unless means are provided to heat and maintain temperature of masonry materials and protect completed work from freezing. Protection shall consist of heating and maintaining temperature of masonry materials to at least 40 deg F, and maintaining an air temperature above 40 deg F on both sides of masonry for at least 48 hrs.

PART 2 - PRODUCTS

2.1 FACING BRICK

- A. Field Brick: ASTM C 216, SW Grade, FBA, 3-5/8"W x 2-1/4"H x 7-5/8"L.
 - 1. Brick : Ragland Clay Products, provided by Antique Brick & Block, Modular 8" Full Range Kingston Scratch.

2.2 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150 Type I, except Type III may be used for cold weather construction.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Aggregate for Mortar: Sand, conforming to ASTM C144 or ASTM C404, Size No. 2.
- D. Aggregate For Grout: ASTM C 404, Size No. 8 or Size No. 89.
- E. Water: Clean, drinkable.
- F. Integral Waterproofing (mortar at exterior veneer): Aqua Stop Plus, AcmeShield, Sonneborn "Hydrocide Powder", or approved equal.
- G. NOTE: Precision Packaging "Spec-Mix" system (for Type S spec mix blended portland/lime mortar) is acceptable for use on this project at contractor's option.

2.3 MASONRY ACCESSORIES

- A. Manufacturers: Hohmann & Barnard, Dur-O-Wal, AA Wire Products, National, or approved equal.

B. Wall Ties And Anchors:

1. At Concrete Foundations: 1" wide X 1" deep X 3/4" throat, 24 gage hot dipped galvanized dovetail anchor slot, and hot dipped galvanized dovetail triangle with 1/4" wire tie and 12 gage hot dipped galvanized dovetail.
2. At Metal Framing: Hohmann & Barnard DW-10X, hot dipped galvanized, 12 gage, with Vee-Tie, hot dipped galvanized, 1/4" diameter.
3. At Steel: 9" long X 3/4" wide, 12 gage, flat continuous adjustable weld-on anchor, hot dipped galvanized, and 3/16" gage square nosed beam tie, hot dipped galvanized.

2.4 CONCEALED FLASHING

- A. Flexible sheet flashings formulated from virgin polyvinyl chloride with plasticizers and other modifiers to remain flexible and waterproof in cconcealed masonry applications, black in color; 20 mils thick. Nervastral HD or Wasco Type 20.

2.5 SEALANT CONTROL JOINTS MATERIALS

- A. Specified and furnished in Section 07900, installed under this section.

2.6 MORTAR AND GROUT MIXTURES

- A. Mortar Mix: ASTM C 270, Type S, with integral waterproofing at exterior veneer.
- B. Grout Mix: ASTM C 476.
- C. Measure and batch materials either by volume or weight, such that required proportions can be accurately controlled and maintained. Measurement of sand exclusively by shovel will not be permitted. Mix mortars with the maximum amount of water consistent with workability to provide maximum tensile bond strength within the capacity of mortar. Mix ingredients for a minimum of 5 minutes in a mechanical mixer. Do not use mortar or grout which has begun to set, or if more than 2-1/2 hours has elapsed since initial mixing. Retemper mortar during 2-1/2 hour period as required to restore workability. Do not add air-entraining agents or other admixtures to mortar or grout materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the areas and conditions under which masonry is to be installed. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Wet clay brick having ASTM C 67 absorption rates greater than 0.025 oz. per sq. in./minute.
- B. Cleaning Reinforcing: Before placing, remove loose rust, ice and other coatings from reinforcing.

3.3 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces of columns, walls and arrises

do not exceed 1/4" in 10', or 3/8" in a story height not to exceed 20', nor 1/2" in 40' or more. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/4" in any story of 20' maximum, nor 1/2" in 40' or more.

- B. Variation from Level: For lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4" in any bay or 20' maximum, nor 3/4" in 40' or more.
- C. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, do not exceed 1/2" in any bay or 20' maximum, nor 3/4" in 40' or more.
- D. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4" nor plus 1/2".

3.4 INSTALLATION, GENERAL

- A. Thickness: Build single wythe walls to actual thickness of masonry units, using units of nominal thickness indicated.
- B. Leave openings for equipment to be installed before completion of masonry work. After installation of equipment, complete masonry work to match work immediately adjacent to the opening.
- C. Cut masonry units using motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to fit adjoining work neatly. Use full-size units without cutting wherever possible.
- D. Keep cavities clean of mortar droppings and other materials during wall construction. Strike joints flush facing cavity.
- E. Flashing: Comply with the manufacturer's instructions for handling and installation of flashing to provide a complete membrane over area to be flashed. Seal projections through sheet and lap and seal seams. Bond as recommended by manufacturer.

3.5 LAYING MASONRY WALLS

- A. Lay walls plumb and true to comply with specified tolerances, with courses level, accurately spaced and coordinated with other work.
- B. Do not tooth corners.
- C. Build-in items specified under this and other sections of this specification. Fill in solidly with masonry around built-in items. Fill space between hollow metal frames and masonry solidly with mortar.
- D. Joints: Lay walls with 3/8" joints. Use as dry a mortar mix as practicable and compress joints as much as possible to produce a dense tight joint.
 - 1. Concealed joints: Strike flush.
 - 2. Exposed brick joints: "Rough" concave joint.
- E. King size brick: Cut no brick less than 3" nominal (2 3/4" actual)
- F. Coursing: Course king size brick in 1/2 bond, cut starter brick for outside corners at 7 3/4".

3.6 ANCHORING MASONRY WORK

- A. Anchor single wythe masonry veneer to concrete with specified dovetail anchors and

triangles spaced 16" o.c. vertically and horizontally.

- B. Anchor single wythe masonry veneer to structural members with specified beam ties and traingle ties spaced 16" o.c.
- C. Anchor single wythe masonry veneer to metal framing with specified anchors spaced not more than 16" o.c. vertically and 16" o.c. horizontally. Install additional anchors within 12 inches of openings and at intervals around perimeter not exceeding 8".

3.7 CONTROL AND EXPANSION JOINTS

- A. Install vertical expansion control and isolation joints as indicated, and at maximum 30" o.c. at long wall runs, and at large openings in wall. Build-in related items as masonry work progresses. Refer to Section 07900 for sealants.

3.8 CLEANING

- A. Clean exposed brick masonry surfaces by the bucket and brush hand cleaning method or by high pressure water method.

END OF SECTION 04200

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SECTION 05120 - STRUCTURAL STEEL

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 SCOPE

- A. Provide all structural steel work, complete.

1.3 SUBMITTALS

- A. Comply with Section 01300, unless noted.
- B. Shop Drawings:
 - 1. Submit shop drawings including complete details and schedules for fabrication and shop assembly of the members, and details, schedules, procedures and diagrams showing the sequence of erection. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols, and show size, length, and type of each weld. Provide setting drawings, templates, and directions for the installation of anchor rods and other anchorages to be installed by others.
 - 2. The Contractor shall submit electronic shop drawing for review. The contractor shall require all shop drawings to be checked 100 percent before they are submitted to the Architect Engineer for review. Failure to do so will result in the shop drawings being considered incomplete and rejected.
- C. Certification: Submit current certification papers (within last 3 years) for each welder.

1.4 QUALITY ASSURANCE

- A. Codes And Standards: Comply with the following:
 - 1. AISC "Code of Standard Practice for Steel Buildings and Bridges".
 - 2. AISC "Specifications for Structural Steel Buildings", including "Commentary".
 - 3. AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Structural Connections.
 - 4. AWS D1.1 "Structural Welding Code - Steel".
- B. Qualifications For Welding Work: Qualify welding procedures and welding operators in accordance with AWS "Qualification" requirements.
- C. Testing And Inspection:

1. The Contractor shall employ an independent testing agency, acceptable to Owner and Architect, to inspect welded and bolted connections. The following items will be included in testing agency inspection:
 - a. Visual inspection of all welded and bolted connections for quality.
 - b. Check by ultrasonic (or other means approved by Owner's representative) all of beam to beam or column full penetration-welds. After 2 beams (1 top and 1 bottom flange each) welds have been placed by each welder, the testing agency shall check and approve these welds before additional welds are placed. Each welder shall mark his weld.
 - c. Test approximately 10% of high strength bolts for correct nut tightness.
2. Correct as directed, at Contractor's expense, connections that are found unsatisfactory by testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site at such intervals as to ensure uninterrupted progress of work.
- B. Deliver anchor rods and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time not to delay work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. If bolts and nuts become dry or rusty, clean and relubricate before use.
- D. Do not store materials on structure in manner that might cause distortion or damage to members or supporting structures. Repair and replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: For fabrication of work that will be exposed to view, use only materials that are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and apply surfaces finishes.
- B. Structural W Steel Shapes: ASTM A 992.
- C. Channels, angles, plates and bars : shall be ASTM A360 A572
- D. Cold Formed Steel Tubing: ASTM A500, Grade B, $F_y=46$ ksi.
- E. Steel Pipe: ASTM A 53, Type E or S, Grade B; or ASTM A 501.
- F. High Strength Threaded Fasteners: ASTM A 325, Type 1.
- G. Unfinished Threaded Fasteners: ASTM A 307, Grade A.
- H. Headed Stud-Type Shear Connectors: ASTM A 108, Grade 1015 or 1020, cold-finished carbon steel with dimensions complying with AISC specifications.
- I. Anchor Rods: ASTM A 36, nonheaded type, unless otherwise indicated.

- J. Electrodes For Welding: Comply with AWS Code.
- K. Grout: Non-Metallic Shrinkage-Resistant Grout: Conspec 100 Non-Shrink Grout (Non-Metallic)," Euclid "Euco N.S.," L & M "Crystex," Master Builders "Masterflow 713," W. R. Meadows "Sealtight 588 Grout," or approved equal.
- L. Shop Paint: Lead free, alkyd primer; Tnemec 10-99 Series, Southern Coatings Enviro-Guard 1-2900, or approved equal, meeting performance requirements of TT-P-86, Type 1, and passing ASTM B 117 after 500 hours with no blistering, cracking, softening, delamination, or rust creepage at scribe and rusting at edges.

2.2 FABRICATION

- A. Shop Fabrication And Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.
 - 1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.
 - 2. Where shop 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.
- B. Connections: Weld or bolt shop connections, as indicated.
 - 1. Bolt field connections, except where welded connections or other connections are indicated.
 - a. Provide high-strength threaded fasteners for principal bolted connections, except where unfinished bolts are indicated.
 - b. Provide unfinished threaded fasteners as noted and for temporary bracing to facilitate erection.
 - 2. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints Using ASTM A 325 or A 490 Bolts".
- C. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.
- D. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld shear connectors in field, spaced as shown, to beams and girders. Use automatic end of welding of headed stud shear connectors in accordance with manufacturer's printed instructions.
- E. Holes For Other Work: Provide holes for securing other work to structural steel framing.
 - 1. Provided threaded nuts welded to framing and other specialty items as indicated to receive other work.
 - 2. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.3 SHOP PAINTING

- A. Shop paint exposed structural steel work. Paint embedded steel which is partially exposed on the exposed portions and the initial 2" of embedded areas only. Do not paint surfaces which are to be welded and interior steel in "air conditioned" spaces.
- B. Surface Preparation: Before painting, thoroughly clean all surfaces of all grease, rust, welding droppings and loose mill scale by methods conforming to SSPC-SP-1 and SSPC-SP-3. After erection, wire-brush and touch-up welded or abraded areas. Touch-up with primer.
- C. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with the manufacturer's instructions and at a rate to provide a uniform dry film thickness of 2.0 mils. Use painting methods which will result in full coverage of joints, corners, edges and all exposed surfaces.

PART 3 - EXECUTION

3.1 ERECTION

- A. Setting Bases And Bearing Plates: Clean bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom of base and bearing plates.
 - 1. Set loose and attached bearing plates and bearing plates for structural members on wedges or other adjusting devices.
 - 2. Tighten nuts on anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
 - 3. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
 - 4. For grout materials, comply with manufacturer's instructions.
- B. Field Assembly:
 - 1. Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clear bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 2. Level and plumb individual members of structure within specified AISC tolerances.
- C. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.
 - 1. Comply with AISC specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

2. Do not enlarge unfair holes in members by burning or by using drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

3.2 TOUCH-UP PAINTING

- A. Cleaning and touch-up painting of field welds, bolted connections and abraded areas of the shop paint on structural steel is included in Section 09900.

END OF SECTION

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SECTION 05310 - METAL DECKING

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 SCOPE

- A. Provide all metal decking, complete, including roof and floor decking.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provision of the following codes and standards:
 - 1. AISI "Specification for the Design of Cold-formed Steel Structural Members".
 - 2. AWS "Structural Welding Code".
 - 3. SDI "Steel Roof Deck Design Manual".
- B. Qualification of Welding Work: Quality welding processes and welding operators in accordance with AWS "Standard Qualifications Procedure".
- C. The Contractor shall employ an independent testing agency, acceptable to the Owner and Architect to inspect the installation of the decking.

1.4 SUBMITTALS

- A. Comply with Section 01300, unless noted.
- B. Manufacturer's Data: Provide manufacturer's technical data indicating compliance with specified requirements, and installation instructions.
- C. Shop Drawings:
 - 1. Submit detailed erection drawings, including layout of deck panels, anchorage details, conditions requiring supplementary framing, jointing, or other accessories.
 - 2. The Contractor shall submit two prints of each shop drawing for review. One checked set will be returned to the Contractor who will then run and distribute all copies required. The Contractor shall require all shop drawings to be checked 100 percent before they are submitted to the Architect Engineer for review. Failure to do so will result in the shop drawing being considered incomplete and rejected.

1.5 PRODUCT HANDLING

- A. Store off the ground with one end elevated to provide drainage. Protect from the elements with waterproof covering, ventilated to avoid condensation.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Steel for Painted Finish: ASTM A611, Grade C.
- B. Steel for Galvanized Finish: ASTM A446, Grade E.
- C. Miscellaneous Steel Shapes: ASTM A36.
- D. Galvanizing: ASTM 525, G60 (0.60 oz. per sq. ft.)
- E. Galvanizing Repair Paint: High zinc-dust content paint for repair of damaged galvanized surfaces complying with Military Specifications MIL-P-21035 (Ships).
- F. Paint for Non-Galvanized Deck: Deck unit manufacturer's baked-on, rust-inhibitive paint, for application to metal surfaces which have been chemically cleaned and phosphate chemical treated.

2.2 FABRICATION

- A. Form deck units in lengths to span 3 or more supports with flush, telescoped or nested 2" end laps and nesting side laps, unless otherwise indicated. Provide deck configurations complying with SDI "Basic Design Specifications", and as specified herein.

2.3 DECKING

- A. Manufacturer's: Vulcraft, Merco, Inryco, Roll Form, U.S. Steel, Wheeling, Mac-Fab, Epic, or acceptable equal.
- B. Roof Decking: as noted on Structural drawings..
- C. All miscellaneous plates, closure strips, etc. shall be galvanized.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions under which metal decking items are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install deck units and accessories in accordance with manufacturer's recommendations and accepted shop drawings. Fasten deck to supporting beams and joists as indicated on structural drawings.

3.3 TOUCH-UP PAINTING

- A. Cleaning and touch-up painting of field welds, abraded areas, and rust spots of shop painting and galvanizing is included under Section 09900.

END OF SECTION

SECTION 05400 - LIGHTGAGE METAL FRAMING

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 SCOPE

- A. Provide cold-formed metal framing units, complete, including C-shaped steel studs at exterior walls, soffits, facias and as noted.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Structural steel is specified in Section 05120.

1.4 SUBMITTALS

- A. Comply with Section 01300.
- B. Product Data: Submit copies of product data for each item of lightgauge framing and accessories.

1.5 QUALITY ASSURANCE

- A. Comply with AISI "Specifications For Design Of Cold Formed Steel Structural Members".
- B. See light gauge metal framing notes on Sheet S0.0.

1.6 PRODUCT DELIVERY AND STORAGE

- A. Protect metal framing units from rusting and damage. Deliver to the project site in manufacturer's unopened containers or bundles, fully identified with name, brand, type, location and spacing.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. ClarkDietrich, USG, Marino, Dale/Incor, Superior, Gold Bond, or approved equal.

2.2 METAL FRAMING SYSTEM

- A. System Components: Provide manufacturer's standard steel studs of type, size, shape, and gage indicated. With each type of metal framing required, provide manufacturer's standard steel runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners, and accessories as indicated and as recommended by manufacturer for application indicated, as needed to provide a complete metal framing system.

- B. Materials and Finishes:
 - 1. For 16 gage and heavier units, fabricate metal framing components of structural quality steel sheet with a minimum yield point of 50,000 psi ASTM A 446, A 570 or A 611.
 - 2. For 18 gage and lighter units, fabricate metal framing components of commercial quality steel sheet with a minimum yield point of 33,000 psi; ASTM A 446, A 570, or A 611.
 - 3. Provide galvanized finish to metal framing components complying with ASTM A 525 for minimum G 60 coating.
- C. Fasteners: Provide nuts, bolts, washers, screws, and other fasteners with corrosion-resistant plated finish.
- D. Electrodes For Welding: Comply with AWS Code and as recommended by stud manufacturer.
- E. Minimum Gauges: Provide minimum 18 gauge metal studs at all exterior wall framing. Provide minimum 20 gauge metal studs at all interior stud walls.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install metal framing systems in accordance with manufacturer's printed or written instructions and recommendations, and final shop drawings.
- B. Runner Tracks: Install continuous tracks sized to match studs.
- C. Wall Studs: Space studs 16" o.c., unless noted.
 - 1. Secure studs to top and bottom runner tracks by screw fastening at both inside and outside flanges.
 - 2. Set studs plumb.
 - 3. Where stud system abuts structural columns or walls anchor ends of bridging to supporting structure.
 - 4. Install supplementary framing, blocking and bracing in the metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with stud manufacturer's recommendations and industry standards in each case, considering the weight or loading resulting from the items supported.
 - 5. Frame wall openings larger than 2' square with double stud at each jamb of frame except where more than two are either shown or indicated in manufacturer's instruction. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with stud shoes or by welding, and space jack studs same as full-height studs of wall. Secure studs system wall opening frame in manner indicated.
 - 6. Install horizontal bridging in stud system, spaced (vertical distance) at not more than 5' o.c. Weld or screw at each intersection.

3.2 FIELD PAINTING

- A. Touch-up shop-applied protective coatings damaged during handling and installation. Use galvanized repair paint for galvanized surfaces.

END OF SECTION

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**SECTION 05500 - METAL FABRICATIONS
AND MISCELLANEOUS METAL WORK**

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 SCOPE

- A. Provide miscellaneous metal work, complete, including:
 - 1. Pipe railings and handrails.
 - 2. Ladder.
 - 3. Metal pan stairs.
 - 4. Steel supports for work of other trades.
 - 5. Miscellaneous metal steel attachments, anchors, plates, angles, etc.
 - 6. Anchors angles, bolts, expansion shields for items in this section only, and other accessories shown in details and or required for the complete installation of all work.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Cast-In-Place Concrete; Section 03300.
- B. Aluminum window frames and finishing of ornamental grillwork; Section 08410.

1.4 SUBMITTALS

- A. Comply with Section 01300.
- B. Product Data: Submit for products used in miscellaneous metal fabrications, including paint products and grout.
- C. Shop Drawings: Submit shop drawings for the fabrication and erection of all assemblies of miscellaneous metal work. Include plans, elevations, sections, and details of fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other sections.

1.5 PROJECT CONDITIONS

- A. Field Measurements:
 - 1. Check actual locations of, walls and other construction to which metal fabrications must fit, by accurate field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.

2. Where field measurements cannot be made without delaying work, guarantee dimensions and proceed with fabrication of products without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Metal Surfaces, General: For metal fabrications exposed to view upon completion of work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, and roughness.
- B. Miscellaneous Steel Bars, Rods and Shapes: ASTM A 36, A 283, A 108, A 663, A 501, and A 575, as applicable.
- C. Pipe: ASTM A 53 black finish steel pipe, standard weight (Schedule 40) .
- D. Aluminum Extruded Bar and Tube: ASTM B 221, alloy 6063T5/T52.
- E. Bolts and Nuts: ASTM A 307, Grade A. High strength bolts; ASTM A 325. Hot-dip galvanize all items in accordance with ASTM A 153.
- F. Expansion Bolts Wedge Anchors: Ramset "Trubolt" or Hilti "Kwik Bolt."
- G. Adhesive Anchors: Hilti "HVA."
- H. Expansion Shields: F.S. FF-S-325
- I. Anchor Rods: Furnish and deliver to site, anchor rods and other items to be embedded in concrete. Provide necessary shop details and diagrams for concrete forms and, if required, provide templates to insure proper and accurate locations and setting of anchor rods.
- J. Toggle Bolts: Tumble-wing type F.S. FF-B-588 type, class and style as required.
- K. Lock Washers: F.S. FF-W-84, helical spring type carbon steel.
- L. Welding Rods And Electrodes: Select in accordance with AWS specifications for metal alloy to be welded.
- M. Miscellaneous Items: Furnish bent or otherwise custom fabricated bolts, plates, z-clips, anchors, hangers, dowels and other miscellaneous steel shapes as required for framing and supporting work and for anchoring or securing work to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Section 06100.
- N. Shop Paint: Lead free, alkyd primer; Tnemec 10-99, Southern Coatings Enviro-Guard 1-2900, or approved equal, meeting performance requirements of F.S. TT-P-86, and passing ASTM B 117 after 500 hours. Primer selected must be compatible with finish coats of paint. Coordinate selection of metal primer with finish paint requirements specified in Section 09900.
- O. Galvanizing Repair Paint: High zinc dust content paint for reglvanizing welds in galvanized steel work, complying with SSPC-Paint 20.
- P. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12

except containing no asbestos fibers.

- Q. Non-shrink Nonmetallic Grout: Conspec "100 Non-Shrink Grout NonMetallic," Master Builders "Masterflow 713," Euclid "Euco N.S. Grout," L & M "Crystex," or U. S. Grout "Five Star Grout," or Sonneborn "SonogROUT," or W.
- R. Meadows "Sealtight 588 Grout".

2.2 FABRICATION, GENERAL

- A. Workmanship: Use materials of size and thickness shown or, if not shown, of required size and thickness to produce strength and durability in finished product. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components of work.
- B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32" unless otherwise shown. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise close up impairing work.
- C. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.
- D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, Phillips flat-head (countersunk) screws or bolts. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use. Cut reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.
- E. Shop Painting:
 - 1. Shop paint miscellaneous metal work, except concealed metal work, members or portion of members to be embedded in concrete or masonry, surfaces and edges to be field welded, and galvanized surfaces, unless otherwise specified.
 - 2. Remove scale, rust and other deleterious materials before applying shop coat. Clean off heavy rust and loose mill scale in accordance with SSPC SP-2 or SSPC SP-3.
 - 3. Remove oil, grease and similar contaminants in accordance with SSPC SP-1.
 - 4. Immediately after surface preparation, brush or spray on primer in accordance with manufacturer's instructions, and at rate to provide uniform dry film thickness of 2.0 mils for each coat. Use painting methods which will result in full coverage of joints, corners, edges, and exposed surfaces.

2.3 MISCELLANEOUS METAL FABRICATIONS

- A. Pipe Railings And Handrails:
 - 1. Fabricate of standard weight steel pipe to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of- pipe, post spacings, and anchorage, but not less than that required to support structural loads.

2. Interconnect railing and handrail members using butt-welding or welding with internal connectors.
 3. Form changes in direction by insertion of prefabricated elbow fittings, by radius bends or by bending.
 4. Provide wall returns at ends of wall-mounted handrails.
 5. Close exposed ends of pipe by welding 3/16" thick steel plate in place or by use of prefabricated fittings.
 6. Brackets, Flanges, Fittings, Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnections of pipe and attachment of railings and handrails to other work. Furnish inserts and other anchorage devices for connecting railings and handrails to concrete.
 7. Prime as specified in this section.
- B. Steel Wall Ladder: Steel bars, rods and shapes of sizes and designs indicated, and securely anchored to floor and wall.
- C. Metal Pan Stairs: Fabricate of 12 gage steel treads and risers bolted to angles and welded or bolted to stringers. Concrete fill is specified in Section 03300.
- D. Steel Supports: Provide structural steel lintels, channels, braces, angles, etc., as indicated and assemble as detailed. Secure all connections to provide rigid supports for all items required including supports not specifically specified in other sections.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to site.
- B. Set sleeves in concrete with, tops flush with finish surface elevations; protect sleeves from water and concrete entry.

3.2 INSTALLATION

- A. Fastening To In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.
- B. Cutting, Fitting, Placement: Perform cutting, drilling and fitting required for installation. Set metal fabrication accurately in location, alignment and elevation; with edges and surfaces level, plumb, true, and free of rack; measured from established lines and levels.
- C. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.
- D. Setting Loose Plates:
1. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom of surface of bearing plates.
 2. Set loose leveling and bearing plates on wedges, or other adjustable devices. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with edge of bearing plate before packing with grout.
- E. Steel Pipe Railings And Handrails: Set pipe in concrete in non-corrosive pipe sleeves with non-shrink grout or anchor to supports as indicated or required by project conditions. Secure handrails to wall with wall brackets and end fittings.
- F. Ornamental Aluminum Grillwork: Mount grille to aluminum window frame using 1/2" X 10/24 undercut flathead machine screws. Drill and tap completely thru aluminum grill with screws and dress down any exposed portion of the screw. Isolate steel hinges from aluminum as recommended by hinge manufacturer. Coordinate with Section 08410 for steel backing and blocking as required to support grill weight.

3.3 TOUCH-UP SHOP PAINTING

- A. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Use galvanizing repair paint on damaged galvanized surfaces.

END OF SECTION

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SECTION 06100 - CARPENTRY

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 SCOPE

- A. Provide carpentry work, complete. In general, this work includes the following:
 - 1. Concealed framing, studs, furring.
 - 2. Braces, stripping, backing, blocking, cants, grounds, and nailers indicated or necessary to install cabinetwork, toilet room accessories, and to receive or back work of other trades.
- B. Wall Sheathing.
- C. Roof decking.

1.3 QUALITY ASSURANCE

- A. Grading Marks: Factory-mark each piece of lumber with type, grade, mill and grading agency identification; and submit mill certificate that material has been inspected and graded in accordance with requirements if it cannot be marked on a concealed surface.
- B. Wood Preservative Treatment: Label each piece of pressure treated lumber with the Quality Control mark of the American Wood Preservers Bureau showing compliance with the appropriate standard.

1.4 PRODUCT HANDLING

- A. Keep carpentry materials dry during delivery, storage and handling. Store lumber in stacks for air circulation within stacks. Protect bottom of stacks against contact with damp surface. Protect exposed materials against weather. Do not store dressed or treated lumber outdoors.

PART 2 - PRODUCTS

2.1 SOFTWOOD

- A. Comply with the standards of WCLIB, "Standard Grading Rules for West Coast Lumber", for Douglas fir, and SPIB "Standard Grading Rules for Southern Pine Lumber", for Southern pine.
 - 1. For structural light framing 2" to 4" thick, 2" to 4" wide, and studs use KD, S4S, No. 2.
 - 2. For light framing 2" to 4" thick, 2" to 4" wide, use KD, S4S, Construction Grade.

2.2 SOFTWOOD PLYWOOD

- A. Comply with PS-1, exposure 1, group 1, use C-D grade, at wall sheathing and roof decking.

2.3 ROUGH HARDWARE

- A. Nails, metal connectors, bolts, nuts, screws, washers, staples, and other fasteners (except as specified or noted otherwise); hot-dip galvanized steel.

2.4 WOOD PRESERVATIVE TREATMENTS

- A. Pressure treat above-ground items with water-borne preservatives to comply with AWPB-LP-2. After treatment, kiln-dry lumber to a maximum moisture content, of 19 percent. Treat indicated items and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, stripping and similar concealed members in contact with masonry and concrete.
 - 3. Wood framing members less than 18" above grade.
 - 4. Wood floor plates installed over concrete slabs directly in contact with earth.
- B. Complete fabrication of treated items prior to treatment, where possible. If cut after treatment, coat cut surfaces with heavy brush coat of same chemical used for treatment and to comply with AWPB M4.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Discard units of material with defects which might impair quality of work, and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement.
- B. Set carpentry work to required levels and lines, with members plumb and true to line and cut and fitted.
- C. Securely attach carpentry work to substrate by anchoring and fastening as indicated and as required by recognized standards. Countersink nail heads on exposed carpentry work and fill holes.
- D. Use common wire nails, except as otherwise indicated or specified. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required.
- E. Anchor carpentry work to anchorage devices or blocking built-in or directly attached to substrates. Secure to grounds, strips, backing, and blocking, of thickness and shape required to secure work and equipment in place, as indicated on the drawings or

required by conditions. Fasten wood grounds, furring and other engaging woodwork

to various types of walls with approved types and sizes of nails, ties, and inserts, spaced to provide rigid secure supports.

3.2 ROUGH CARPENTRY

- A. Provide wood grounds, strips, bucks, plates, backing, and blocking, of thickness and shape required to secure work and equipment in place, as indicated on drawings or required by conditions. Fasten with approve types and sizes of nails, ties, and inserts, spaced to provide rigid secure supports.

3.3 ROUGH HARDWARE

- A. Provide rough hardware necessary or required for installation of work specified. Use sufficient size and number of spikes, nails, screws, bolts, etc., to insure rigidity, security, and permanence.

3.4 CLEAN-UP

- A. Remove from the premises all rubbish, debris, and unused materials which may be accumulated during the progress of the work.

END OF SECTION

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SECTION 06400 - ARCHITECTURAL WOODWORK

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 SCOPE

- A. Provide architectural woodwork items, complete, including bathroom lavatory counters.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Finishing; Section 09900.

1.4 QUALITY ASSURANCE

- A. Cabinet Material and Fabrication Standards: Paint grade for areas to receive painted finish as indicated, in accordance with the latest edition of the Architectural Woodwork Institute Quality Standards and Guide Specifications, conforming to the following sections except where modified elsewhere in this section.
 - 1. Section 100 - Lumber
 - 2. Section 200 - Panel Products
 - 3. Section 300 - Standing and Running Trim
 - 4. Section 400 - Architectural Cabinets
 - 5. Section 1700 - Installation
- B. Fabrication of architectural woodwork to be by a single firm.

1.5 SHOP DRAWINGS

- A. Comply with Section 01300.
- B. Product Data: Submit manufacturer's product data for each product and process specified as work of this section and incorporated into items of architectural woodwork during fabrication, finishing, and installation.
- C. Shop Drawings: Prior to fabrication, submit shop drawings indicating location, material quality and species, fabrication and assembly details.
- D. Samples: Submit samples, in full color and pattern ranges for Architect's selection, for solid surface counter top material.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver store, and handle architectural woodwork in a manner to prevent damage and deterioration. Protect all surfaces of items subject to damage during transit. Coordinate delivery and storage with trade providing installation.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Conform to Sections 100 and 200 of reference standard, except as modified below.
- B. Exposed Solid Wood for Opaque Finish: Birch.
- C. Solid Wood for Semi-exposed Members: Same as exposed members.
- D. Solid Wood for Concealed Members: Douglas fir or Southern Pine.
- E. Exposed Plywood for Opaque Finish: Birch.
- F. Semi-exposed Plywood: Same as exposed plywood.
- G. Concealed Plywood: Douglas fir.
- H. Plywood Cores; use only plywood, particle board shall not be used.
- I. Fasteners And Anchors: Screws (F.S. FF-S-111), nails (F.S. FF-N-105), and anchors and expansion bolts of material, type, and finish required for each use and for secure anchorage.

2.2 FABRICATION AND MANUFACTURE

- A. Cabinets: Comply with specified sections of referenced standard, except do not use staples in exposed millwork construction.

2.3 COUNTERTOPS

All counter tops at lavatory counters that are a part of millwork units shall consist of plastic laminate on ¾" plywood as specified below:

- A. Standard quality plastic laminate on ¾" plywood. Manufacturers such as Armstrong, Nevamar, Wilson Art, or approved equal.
 - 1. Thickness; on ¾" plywood.
 - 2. Edge treatment; as indicated on the drawings.
 - 3. Color; to be selected by the Architect.
 - 4. Mounting; Seamed undermount.
 - 5. Backsplash; Applied
 - 6. Sidesplash; Applied.
 - 7. Flammability; Class A, 25 or less flame spread and smoke.
 - 8. Gloss; Standard matt finish.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Condition woodwork to average prevailing humidity conditions in installation areas prior to installing.
- B. Prior to installation, examine shop fabricated work for completion, and complete work as required, including back priming and removal of packing.

3.2 INSTALLATION

- A. General:
 - 1. Install woodwork plumb, level, true and straight with no distortions. Shim as required using concealed shims. Install to a tolerance of 1/8" in 8'-0" for plumb and level (including countertops); and with no variations in flushness of

- adjoining surfaces.
- 2. Scribe and cut work to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.
- 3. Anchor woodwork to anchors or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork, and matching final finish where transparent finish is specified.
- B. Cabinets: Install without distortion so that doors and drawers will fit openings properly and be accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete the installation of hardware and accessory items.
- C. Countertops: Anchor securely to base units and other support systems.
- D. Shelving: Complete assembly of units and install at areas indicated, including hardware and accessories.

3.3 ADJUSTMENT, CLEANING, FINISHING AND PROTECTION

- A. Repair damaged and defective woodwork wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean hardware, lubricate and make final adjustments for proper operation.
- C. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop applied finishes to restore damaged or soiled areas.
- D. Protection: Provide final protection and maintain conditions necessary to ensure that the work will be without damage or deterioration at the time of acceptance.

END OF SECTION

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SECTION 07110 - SHEET MEMBRANE WATERPROOFING

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 SCOPE

- A. Provide 10 mill vapor barrier as called out complete.

1.3 SUBMITTALS

- A. Comply with Section 01300.
- B. Product Data: Submit product data and general recommendations from waterproofing materials manufacturer for types of materials required.
- C. Samples: Submit samples of sheet waterproofing and auxiliary materials as requested by Architect.
- D. Certificates: Include certificates substantiating that materials comply with specified requirements.

1.4 QUALITY ASSURANCE

- A. Manufacturer: Obtain primary materials from a single manufacturer, to greatest extent possible. Provide secondary materials only as recommended by manufacturer of primary materials.
- B. Installer: Firm with not less than three years of successful experience in installations similar to requirements of this project and which is acceptable to manufacturer of primary waterproofing system manufacturers.

1.5 PROJECT CONDITIONS

- A. Substrate: Proceed with work after substrate construction, openings, and penetrating work have been completed.
- B. Weather: Proceed with work only when existing and forecasted weather conditions will permit work to be performed in accordance with manufacturers' recommendations and warranty requirements.

1.6 WARRANTY

- A. Submit written warranty, executed by manufacturers, agreeing to repair and replace sheet membrane waterproofing system that fails in materials and workmanship.
- B. Warranty period is five (5) years.

PART 2 – PRODUCTS

2.1 VAPOR BARRIER

- A. Provide 10 mil vapor barrier as called out on the Structural Drawings at all areas under concrete floor slabs except at the deeply excavated areas called out above.

2.2 AUXILIARY MATERIALS

- A. Adhesives and Joint Tapes: Provide types of adhesive compound and tapes recommended by waterproofing sheet manufacture for bonding to substrate (if required), for waterproof sealing of joints between membrane and flashings, adjoining surfaces, and projections through membrane.
- B. Primers: Provide type of concrete primer recommended by manufacturer of sheet waterproofing material for applications required.
- C. Flashing Materials: Except as otherwise indicated, provide types of flexible sheet material for flashing as recommended by waterproofing sheet manufacturer.
- D. Protection Board: Provide type of protection board recommended by waterproofing sheet manufacturer. Include adhesives recommended by manufacturer.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Comply with manufacturers instructions for surface preparation.

3.2 INSTALLATION

- A. Comply with manufacturer's instructions for handling and installation of sheet - waterproofing materials.
- B. Coordinate installation of waterproofing materials and associated work to provide complete system complying with combined recommendations of manufacturers and installers involved in work. Schedule installation to minimize period of exposure of sheet waterproofing materials.
- C. Seal projections through membrane and seal seams. Bond to vertical surfaces.
- D. Extend waterproofing sheet as indicated and finish under flashing. Seal exposed edges with mastic or sealant.
- E. Install protection board over completed membrane, complying with manufacturer's recommendations for both waterproofing sheet and protection course materials.

3.3 PROTECTION

- A. Provide for protection of completed membrane during installation of other materials or processes over membrane and throughout remainder of construction period.

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END OF SECTION

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SECTION 07190 – WATER REPELLANTS

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 clear water-repellent coatings for the following vertical surfaces:
 - 1. Precast concrete beltcourse, brick veneer, and precast concrete window lintels at exterior walls.
- B. Related Sections include the following:
 - 1. Division 3 Sections for concrete work including floor sealers and curing agents, precast concrete.
 - 2. Division 4 Sections for concrete unit masonry.
 - 3. Division 7 Section "Joint Sealants" for joint sealants.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide water repellents with the following properties based on testing manufacturer's standard products, according to test methods indicated, applied to substrates simulating Project conditions using same materials and application methods to be used for Project.
 - 1. Absorption: Minimum 90 percent reduction of absorption after 24 hours in comparison of treated and untreated specimens.
 - a. Precast Concrete: ASTM C 97.
 - b. Hardened Concrete: ASTM C 642.
 - 2. Water-Vapor Transmission: Maximum 10 percent reduction in rate of vapor transmission in comparison of treated and untreated specimens, per ASTM E 96.
 - 3. Water Penetration and Leakage through Masonry: Maximum 90 percent reduction in leakage rate in comparison of treated and untreated specimens, per ASTM E 514.
 - 4. Durability: Maximum 5 percent loss of water repellency after 2500 hours of weathering in comparison to specimens before weathering, per ASTM G 53.

1.4 SUBMITTALS

- A. Product Data: Include manufacturer's specifications, surface preparation and application instructions, recommendations for water repellents for each surface to be treated, and protection and cleaning instructions. Include data substantiating that materials are recommended by manufacturer for applications indicated and comply with requirements.
- B. Samples: Of each substrate indicated to receive water repellent, 12 inches (300 mm) square, with specified repellent treatment applied to half of each sample.
- C. Applicator Certificates: Signed by manufacturer certifying that the applicator complies with requirements.
- D. Certification by water repellent manufacturer that products supplied comply with local regulations controlling use of VOCs.
- E. Material Test Reports: Indicate and interpret test results for compliance of water repellents with requirements indicated.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage a firm with no less than 3 years experience who employ only persons trained and approved by water repellent manufacturer for application of manufacturer's products.
- B. Regulatory Requirements: Comply with applicable rules of pollution-control regulatory agency having jurisdiction in Project locale regarding VOCs and use of hydrocarbon solvents.
- C. Field Samples: Architect will select one representative surface for each substrate to receive water repellents. Apply water repellent to each substrate, with either partial or full coverage as directed. Comply with application requirements of this Section.
 - 1. Obtain Architect's approval of field samples before applying water repellents.
 - 2. Maintain field samples during construction in an undisturbed condition as a standard for judging the completed Work.

1.6 PROJECT CONDITIONS

- A. Weather and Substrate Conditions: Do not proceed with application of water repellent under any of the following conditions, except with written instruction of manufacturer:
 - 1. Ambient temperature is less than 40 deg F (4.4 deg C).
 - 2. Concrete surfaces and mortar have cured for less than 28 days.
 - 3. Rain or temperatures below 40 deg F (4.4 deg C) are predicted within 24 hours.
 - 4. Application is earlier than 24 hours after surfaces have been wet.
 - 5. Substrate is frozen or surface temperature is less than 40 deg F (4.4 deg C).
 - 6. Windy condition exists that may cause water repellent to be blown onto vegetation or surfaces not intended to be coated.

1.7 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Special Warranty: Submit a written warranty, executed by the applicator and water repellent manufacturer, covering materials and labor, agreeing to repair or replace materials that fail to provide water repellency within the specified warranty period. Warranty does not include deterioration or failure of coating due to unusual weather phenomena, failure of prepared and treated substrate, formation of new joints and cracks in excess of **1/16 inch (1.5 mm)** wide, fire, vandalism, or abuse by maintenance equipment.
 - 1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Products: For new precast concrete belt course, face brick veneer, and precast concrete window lintels etc. Prime-A-Pell H₂O is the basis of design, others listed below are acceptable:
 - 1. Siloxanes: With **3.3 lb/gal. (400 g/L)** VOCs or less.
 - a. Prime A Pell H₂O; Chemprobe Technologies, Inc.
 - b. Diedrich 300-5 Water-Base Siloxane; Diedrich Technologies, Inc.
 - c. Diedrich 300-10 Water-Base Siloxane; Diedrich Technologies, Inc.
 - d. Diedrich 303S-15 Silox Seal; Diedrich Technologies, Inc.
 - e. Hydrozo Clear 16; Harris Specialty Chemicals, Inc.
 - f. Weather Seal Siloxane WB; ProSoCo, Inc.

2.2 WATER REPELLENTS

- A. Siloxanes: Penetrating water repellent. Alkylalkoxysiloxanes that are oligomeric with alcohol, ethanol, mineral spirits, water, or other proprietary solvent carrier.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Clean substrate of substances that might interfere with penetration or performance of water repellents. Test for moisture content, according to repellent manufacturer's written instructions, to ensure surface is sufficiently dry.
- B. Test for pH level, according to water repellent manufacturer's written instructions, to ensure chemical bond to silicate minerals.
- C. Protect adjoining work, including sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live plants and grass.
- D. Coordination with Sealants: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
 - 1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those used in the work.
- E. Test Application: Before performing water-repellent work, including bulk purchase and delivery of products, prepare a small application in an unobtrusive location and in a manner approved by Architect to demonstrate the final effect (visual, physical, and chemical) of planned application. Proceed with work only after Architect approves test application or as otherwise directed.

3.2 APPLICATION

- A. Apply a heavy-saturation spray coating of water repellent on surfaces indicated for treatment using low-pressure spray equipment. Comply with manufacturer's written instructions for using airless spraying procedure, unless otherwise indicated.
 - 1. Precast Work: At Contractor's option, first application of water repellent on precast concrete units may be completed before installing units. Mask sealant-bond surfaces to prevent water repellent from migrating onto joint surfaces.
- B. Apply a second saturation spray coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Provide services of a factory-authorized technical service representative to inspect and approve the substrate before application and to instruct the applicator on the product and application method to be used.

3.4 CLEANING

- A. Protective Coverings: Remove protective coverings from adjacent surfaces and other protected areas.
- B. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Repair damage caused by water-repellent application. Comply with manufacturer's written cleaning instructions.

END OF SECTION

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SECTION 07210 THERMAL INSULATION

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 SCOPE

- A. Provide building and perimeter insulation, complete.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Sound insulation; Section 09250.

1.4 SUBMITTALS

- A. Comply with Section 01300. Submit manufacturer's installation instructions for each type of insulation. Include data substantiating that materials comply with physical and thermal properties, and other requirements of specified insulation.

1.5 PRODUCT HANDLING

- A. Do not allow insulation materials to become wet or soiled. Comply with manufacturer's instructions for handling, storage, and protection during installation.

1.6 JOB CONDITIONS

- A. Do not proceed with the installation of insulation until the work which follows (and which conceals the insulation) is scheduled to follow immediately.

PART 2 - PRODUCTS

2.1 THERMAL INSULATION, BUILDING WALLS with METAL STUDS

- A. Batt Insulation: Owens/Corning, Manville, are the basis of design, or acceptable equal. 4" thick (R-13) and 6" thick (R-19) kraft-faced fiberglass insulation. Provide in 16" width, or in same width as stud spacing. Typical at exterior 6" stud walls and 6" stud walls at front portico

2.2 THERMAL INSULATION, BUILDING WALLS with CONCRETE MASONRY

- A. At all 6" concrete block walls, which surround areas that are heated and/or cooled, provide loose fill masonry fill insulation, full height of masonry units, in all block voids, such as RYOLEX or equal, loose fill Perlite insulation, by Silbrico Corporation. Install as per manufacturer's recommendations.

2.3 MISCELLANEOUS MATERIALS

- A. Provide adhesive for bonding insulation, mechanical anchors, or other required items, as recommended by the insulation manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's instructions. Extend insulation full thickness over entire surface to be insulated. Cut and fit tightly around obstructions and fill voids with insulation.

END OF SECTION

SECTION 07274 COMMERCIAL BUILDING WRAP

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to this Section.

1.02 SUMMARY

- A. Includes but not limited to:
 - 1. Furnish and install air barrier/weather resistant barrier over exterior of wall
sheathing at all locations regardless of whether or not indicated on drawings to protect exterior sheathing and interior walls.

1.03 RELATED SECTIONS

- A. Section 05400
- B. Section 07600

1.04 REFERENCES:

- A. American Society for Testing and Materials
- B. Technical Association of Pulp and Paper Industry
- C. American Association of Textile Chemists and Colorists

1.05 SUBMITTALS:

- A. General: Submit each item in this Article according to the conditions of the Contract and Division I Specifications Sections.
- B. Product Data: Submit product specifications, technical data and installation instructions of manufacturer equaling or exceeding those specified.

1.06 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer with successful experience in the installation of air barrier/secondary weather resistant barriers.
- B. Install job mock-up using specified air barrier/secondary weather resistant barrier with system of fastening and taping seams as per manufacturer's instructions. Obtain architect's and manufacturer's approval of system for appearance and workmanship standard.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Tyvek, by DuPont Weatherization Systems is the basis of design. Other manufacturers may be acceptable. Any substitutions must be submitted as per Section 01300 and within 60 days of the start of construction as indicated by the date of the Notice to Proceed. The Architect shall be the judge of the equivalency and acceptability of any substitutions.

2.02 MATERIALS

- A. A flash spun-bonded olefin, non-woven, non-perforated secondary weather resistant barrier.
- B. Performance Characteristics:
 - 1. AATCC-127, Water Penetration Resistance, exceeded at 280.
 - 2. TAPPI T-460, Gurley Hill (sec/100cc) Air infiltration at >1500 seconds.
 - 3. ASTM E 96 Method B(g/m²-24hr.) Water vapor transmission of 200.
 - 4. TAPPI T-41D, Basis weight of 2.7 oz/yd.
 - 5. ASTM E96 Method B, Water Vapor Transmission, 28 perms.
 - 6. ASTM E1677, Air Retarder Material Standard Specification, Type I air barrier.
- C. Sealing Tape/Fasteners
 - 1. DuPont Tyvek Tape, DuPont Weatherization Systems.
 - 2. For steel frame construction: DuPont Tyvek Wrap Cap Screws. DuPont Weatherization Systems. 1 5/8" rust resistant screws with 2" diameter plastic cap.
 - 3. For wood frame construction: DuPont Tyvek Wrap Caps, DuPont Weatherization Systems. Nails with large heads or plastic washers.
 - 4. Caulks or Sealants: polyurethane or elastomeric sealants
 - a. Available Products:
 - 1. OSI® Quad Pro-Series®, solvent release butyl rubber sealant.
 - 2. DAP® Dynaflex 230™.
 - 3. Other products as approved and recommended by air barrier/weather resistant barrier manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install Air Barrier over exterior side of exterior wall sheathing.
 - 1. Install Air Barrier after sheathing is installed and before windows and doors are installed. Install lower level barrier prior to upper layers to ensure proper shingling of layers.
 - 2. Overlap Air Barrier at corners of building by a minimum of 12 inches.
 - 3. Overlap Air Barrier vertical seams by a minimum of 6 inches.
 - 4. Ensure barrier is plum and level with foundation, and unroll extending Air Barrier over window and door openings.

5. Attach Air Barrier to wood, insulated sheathing board or exterior gypsum with plastic cap nails every 12" to 18" on vertical stud line with wood stud framing, and screws with washers to metal stud framing. When attaching to masonry, use adhesive recommended by manufacturer.
6. Prepare window and door rough openings as follows:
 - a. Prepare each window rough openings by cutting a modified "I" pattern in the Air Barrier.
 1. Horizontally cut Air Barrier along bottom of header.
 2. Vertically cut Air Barrier down the center of window openings from the top of the window opening down to 2/3 of the way to the bottom of the window openings.
 3. Diagonally cut Air Barrier from the bottom of the vertical cut to the left and right corners of opening.
 4. Fold side and bottom flaps into window opening and fasten every 6 inches. Trim off excess.
 - b. Prepare each rough door opening by cutting a standard "I" pattern in the Air Barrier.
 1. Horizontally cut Air Barrier along bottom of door frame header and along top of sill.
 2. Vertically cut Air Barrier down the center of the door openings from the top of the door opening (header) down to the bottom of the door opening (sill).
 3. Fold side flaps inside around door openings and fasten every 6 inches. Trim off excess.
7. Tape all horizontal and vertical seams of Air Barrier with air barrier manufacturer's tape.
8. Seal all tears and cuts in Air Barrier with air barrier manufacturer's tape.

END OF SECTION

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SECTION 07410 – METAL CEILING PANELS

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 SCOPE

- A. Furnish all labor, materials, tools, equipment and services for all preformed metal wall and ceiling panels, in accordance with the provisions of the Contract Documents.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Structural Steel; Section 05120
- B. Flashing and Sheet Metal; Section 07600

1.4 QUALITY ASSURANCE

- A. Applicable Standards:
 - 1. SMACNA: “Architectural Sheet Metal Manual”, Sheet Metal and Air Conditioning Contractors National Association, Inc.
 - 2. ASTM A 792-83-AZ50: Specifications for Steel Sheet, Aluminum-Zinc Alloy Coated (Galvanized) by the Hot Dip Process, General Requirements (Galvalume), American Society for Testing and Materials.

1.5 SUBMITTALS

- A. Comply with Section 01300.
- B. Shop Drawings: Submit shop drawings indicating method of erection, elevations and details, anticipated loads, flashing, roof curbs, vents, sealants, interfaces with all materials not supplied and proposed identification of component parts and their finishes. Do not proceed with manufacture prior to review of shop drawings. Do not use drawings prepared by the Architect for shop or erection drawings.

1.6 DELIVERY AND STORAGE

- A. Deliver metal wall panels to job site properly packaged to provide protection against transportation damage.
- B. Exercise extreme care in unloading, storing and erecting metal wall panels to prevent bending, warping, twisting and surface damage.
- C. Store all materials and accessories above ground on well skidded platforms. Store under waterproof covering. Provide proper ventilation of metal roof system to prevent condensation build-up between each panel. Do not store panels in contact with other materials that might cause staining, denting or other surface damage.

PART 2 – PRODUCTS

2.1 MANUFACTURER

- A. MBCI Metal Roof and Wall Systems is the basis of design. Equivalent products of other manufacturers may be acceptable. Any substitutions must be submitted as per Section 01300 and within 60 days of the start of construction as indicated by the date of the Notice to Proceed. The Architect shall be the judge of the equivalency and acceptability of any substitutions.

2.2 METAL CEILING PANELS:

- A. MBCI Metal Roof and Wall Systems, or approved equal, Artisan Series, 8” coverage, 24 gauge, 8” wide, with Galvalume Plus finish.
 - 1. Length: Exterior ceiling panels shall run horizontally full length of standard 20’-0 long panel if needed. Use longest length of panels as possible to reduce joints. Screw to underside of ceiling joists.
 - 2. Accessories: Provide manuf. recommended screw fasteners and neoprene washers at 16” o.c. horz. Provide panel closure strips, tape sealant and joint sealant as required for a waterproof installation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A.
 - 1. Inspect installed work of other trades and verify that such work is complete to a point where this work may continue.
 - 1. Verify that installation may be made in accordance with approved shop drawings and manufacturer’s instructions.
 - 2. In the event of discrepancy, notify the Architect. Do not proceed with installation until discrepancies have been resolved.

3.2 INSTALLATION

- A. General:
 - 1. Install metal panels so that they are weather tight, without waves, warps, buckles, fastening stresses or distortions.
 - 2. Install metal panels in accordance with manufacturer’s instructions and shop drawings.
 - 3. Install metal panels plumb, level and straight with seams and ribs parallel, conforming to design as drawn.

3.3 CLEANING

- A. Dispose of excess material and remove debris from site.
- B. Clean work in accordance with manufacturer’s recommendations.
- C. Protect work against damage until final acceptance. Replace or repair to the satis-

fraction of the Architect, any work that becomes damaged prior to final acceptance.

- D. Touch up minor scratches and abrasions with touch-up paint supplied by the metal panel manufacturer.
- E. Do not allow panels or trim to come in contact with dissimilar metals such as copper, lead or graphite. Water run-off from these materials is also prohibited. This specifically includes condensate from roof top units, and a/c units.

END OF SECTION

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SECTION 07411 – STANDING SEAM METAL ROOF

Part - GENERAL

1.01 DESCRIPTION

A. General

1. Furnish all labor, material, tools, equipment and services for all preformed metal roofing as indicated, in accord with provisions of Contract Documents.
2. Completely coordinate with work of all other trades.
3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and completion installation.
4. See Division 1 for General Requirements.

B. Related Work Specified Elsewhere:

1. Structural steel: Section 05120.
2. Flashing and sheet metal: Section 07600.

1.02 QUALITY ASSURANCE

A. Applicable Standards:

1. SMACNA: “Architectural Sheet Metal Manual”, Sheet Metal and Air Conditioning Contractors National Association, Inc.
2. AISC: “Steel Construction Manual”, American Institute of Steel Construction.
3. AISI: “Cold Form Steel Design Manual”, American Iron and Steel Institute (1996 Edition).
4. UL580: “Tests for Uplift Resistance of Roof Assemblies”, Underwriters Laboratories, Inc.
5. ASTM E-283: “Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems”, American Society for Testing and Materials.
6. ASTM E-331: “Standard Test Method for Water Penetration Through Exterior Metal Roof Panel Systems”, American Society for Testing and Materials.
7. ASTM A 792-83-AZ50 (Painted) & ASTM A792-83-AZ55 (Bare Galvalume Plus®), American Society for Testing and Materials.
8. ASTM E 1514-93: “Standard Specification for Structural Standing Seam Steel Roof Panel Systems”, American Society for Testing and Materials.

B. Manufacturer’s Qualifications:

1. Manufacturer has a minimum of five years experience in manufacturing metal roof systems of this nature. Panels specified in this section shall be produced in a permanent manufacturing facility or on manufacturing owned and operated roll-former equipment.

C. Installation Contractor's Qualifications:

1. Installation contractor shall be an approved installer, certified by the manufacturer before the beginning of installation of the metal roof system.
2. Provide five references from five different architects or building owners for projects that have been in service for a minimum of two years, stating satisfactory performance by the installation contractor.

D. Pre-Installation Conference:

1. Prior to installation of roofing system, conduct a pre-installation conference at the project site.
2. Attendance: Owner, Architect, Contractor, Project Superintendent and Installer.
3. Agenda:
 - a. Roofing details and agenda.
 - b. Critical work sequencing and review of phasing plan.
 - c. Inspection sequencing.

1.03 SYSTEM PERFORMANCE REQUIREMENTS

A. Performance Testing:

1. Metal roof system must be tested in accordance with **Underwriters Laboratories, Inc. (UL) Test Method 580** "Tests for Uplift Resistance of Roof Assemblies".
2. Metal roof system must meet the air infiltration requirements of ASTM E-283 when tested with a (20 PSF).
3. Metal roof system must meet the water penetration requirements of ASTM E-331 when tested with a (20 PSF) pressure differential with no uncontrollable water leakage when five gallons per hour of water is sprayed per square foot of roof area.

1.04 DESIGN REQUIREMENTS

A. Roof Design Loads:

1. Design criteria shall be in accordance with the most current version of the applicable local building code.
2. Dead Loads
 - a. The dead load shall be the weight of the SSMR system. Collateral loads, such as sprinklers, mechanical and electrical systems, and ceilings shall not be attached to the panels.
3. Live Loads
 - a. The panels and concealed anchor clips shall be capable of supporting a minimum uniform live load of 20 psf.
4. Roof Snow Loads
 - a. The design roof snow loads shall be as shown on the contract drawings.
5. Wind Loads
 - a. The design wind uplift pressure for the roof system shall be as shown on the contract drawings.

6. Thermal Loads
 - a. Roof panels shall be free to move in response to the expansion and contraction forces resulting from a total temperature range of 100 degrees F during the life of the structure.

1.05 SUBMITTALS

A. Shop Drawings:

1. Submit complete shop drawings and erection details, approved by or supplied by the metal roofing manufacturer, to the architect for review. Do not proceed with manufacture of roofing materials prior to review of shop drawings and field verification of all dimensions. Do not use drawings prepared by the architect for shop or erection drawings.
2. Shop drawings shall be reviewed and stamped by a Professional Engineer licensed in the State of Arkansas.

B. Performance Tests:

1. Submit certified test results by a recognized testing laboratory or manufacturer's lab (witnessed by a professional engineer) in accordance with specified test methods for each panel system.

C. Samples:

1. Submit samples and color chips for all proposed finishes.
 - a. Submit one 8-inch long sample of panel, including clips.

D. Warranties:

1. Finish Warranty:

- a. Panel manufacturers' 20-year warranty against structural defects or corrosion and the 20 year warranty on finish durability.

2. Weathertightness Warranty:

- a. Subcontractor's 5 year guarantee on workmanship and leaks.
- b. Manufacturer's standard 20 year Weathertight Warranty.

F. Test Reports:

1. Submit Test Reports showing that metal panels have been tested in accordance with the Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference of ASTM E 1592-95. Metal roof system must meet the air infiltration requirements of ASTM E 1680-95 when tested with 20 PSF.
2. Submit Test Reports showing that metal panels meet the water penetration requirements of ASTM E 1646-95 when tested with a 20 PSF pressure differential with no uncontrollable water leakage when five gallons per hour of water is sprayed per square foot of roof area.

G. Metal Roof System Fabrication Certification:

1. Submit a letter from the metal roof system manufacturer certifying the panels have been produced in a manner to meet this specification.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery:

1. Deliver metal roof system to job site properly packaged to provide protection against transportation damage.

B. Handling:

1. Exercise extreme care in unloading, storing and erecting metal roof system to prevent bending, warping, twisting and surface damage.

C. Storage:

1. Store bundled sheets off the ground sufficiently high enough to allow air circulation beneath bundle and to prevent rising water from entering bundle. Slightly elevate one end of bundle. Prevent rain from entering bundle by covering with tarpaulin, making provision for air circulation between draped edges of tarpaulin and the ground.

1.07 WEATHERTIGHTNESS WARRANTY

- A.** The Contractor shall provide to the Owner, a 20 warranty signed by the roofing manufacturer of the Standing Seam Roof System.

- B.** An employee of the manufacturer shall inspect the installation at least twice before warranty is issued.

PART 2 – PRODUCTS

2.01 MATERIALS

- A.** MBCI is the basis of design. Other manufacturers, such as Pederson and McElroy may be equal and acceptable. Any substitutions must be submitted as per Section 01300 and within 60 days of the start of construction as indicated by the date of the Notice to Proceed. The Architect shall be the judge of the equivalency and acceptability of any substitutions.

B. Metal roof system profile:

1. Battenlok HS, 16” panel width, 22 gauge, 2” high rib. This is a mechanically seamed roof system.

C. Metal roof system style:

1. Vertical leg, concealed fastener, standing seam, utilizing male and female rib configurations, with factory applied hot metal mastic in female rib, continuously locked together by an electrically powered mechanical seaming device during installation.

D. Gauge:

1. Roof panels shall be 22 gauge galvanized sheet steel.

E. Substrate:

1. Galvalume® steel sheet, minimum yield of 50,000 PSI.

F. Clips:

1. One piece fixed clip, 22 gauge, with factory-applied mastic. (#UL90 rated-Underwriters Laboratories).
2. Two piece floating clip, 18 gauge base, 24 gauge top, with factory applied mastic.
3. Manufacturer shall provide documentation for clip performance, ability to accommodate thermal movement.

G. Texture:

1. Panels shall be have a smooth surface texture.

H. Finish:

1. Galvalume Plus finish on sheet steel.

2.02 MISCELLANEOUS MATERIALS

A. Fasteners:

1. All self-tapping/self-drilling fasteners, bolts, nuts, self-locking rivets and other suitable fasteners shall be designed to withstand specified design loads.
2. Use long life fasteners for all interior and exterior metal roof system applications.
3. Provide fasteners with a factory applied coating in a color to match metal roof system application.
4. Provide neoprene washers under heads of exposed fasteners.
5. Locate and space all exposed fasteners in a true vertical and horizontal alignment. Use proper torque settings to obtain controlled uniform compression for a positive seal without rupturing the neoprene washer.

B. Accessories:

1. Provide all components required per the metal roof system manufacturer's approved shop drawings for a complete metal roof system to include panels, panel clips, ridge, closures, and any other required items.
 - a. All outside closures will be fabricated from material of the same gauge, finish and color as the panels.

- b. All tape seal is to be a pressure sensitive, 100 percent solids, polyisobutylene compound sealing tape with a release paper backing. Provide permanently elastic, non-sagging, non-toxic, non-staining tape seal approved by the metal roof system manufacturer.
- c. All tube sealant is to be a one-part elastomeric polyurethane sealant approved by the metal roof system manufacturer.

C. Ice and Snow Guards:

- a. Provide snow guards for standing seam metal roof system by Rocky Mountain Snow Guard Company, 2055, Raritan Street, Denver, CO.
- b. Provide S5!Colorguard Snow Fence System, with all required component for a complete installation compatible with the MBCI Batten Lok 16 System, including: Standing Seam Clamp, SnoClip, Colorguard Bar, and required splices, etc.
- c. Refer to the drawings , Roof Plan and Elevations for locations.

D. Gutters and Downspouts:

- a. Provide MBCI Box Gutters, 5-1/2”H x 5-1/4”W, #FL-308, 24 guage, for use with BattenLok 16 Series roof system, w/ Galvalume Plus finish.
- b. Provide 4” x 3-1/2” straight downspout material in required lengths, w/ corresponding 45 degree elbows, and downspout straps. All to have Galvalume Plus finish.

2.03 FABRICATION

- A. Where possible roll form panels in continuous lengths, full length of detailed runs.
- B. Fabricate trim/flashings and accessories to detailed profiles.
- C. Fabricate trim/flashings from same material as panel.
- D. Installer owned or operated roll forming equipment will not be acceptable.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

A. Examination:

- 1. Inspect installed work of other trades and verify that such work is complete to a point where this work may continue.
- 2. Verify that installation may be made in accordance with approved shop drawings and manufacturer’s instructions. This specifically includes verifying that secondary structural members and/or decking are installed to meet UL and building code requirements. Coordinate with metal roof system manufacturer to insure that reduced clip spacings at eave, rake, ridge and corner areas are accommodated.

B. Discrepancies:

- 1. In event of discrepancy, notify the architect.

2. Do not proceed with installation until discrepancies have been resolved.

3.02 INSTALLATION

- A. Install metal roof system so that it is weathertight, without excessive warps, buckles, fastening stresses or distortion, allowing for expansion and contraction.
- B. Install metal roof system in accordance with manufacturer's instructions and shop drawings.
- C. Provide concealed anchors at all panel attachment locations.
- D. Install panels plumb, level and straight with seams and ribs parallel, conforming to design as indicated.

3.04 CLEANING, PROTECTION

- A. Dispose of excess materials and remove debris from site.
- B. Clean work in accordance with manufacturer's recommendations.
- C. Protect work against damage until final acceptance. Replace or repair to the satisfaction of the architect (owner), any work that becomes damaged prior to final acceptance.
- D. Touch up minor scratches and abrasions with touch up paint supplied by the metal roof system manufacturer.
- E. **Do not allow panels or trim to come in contact with dissimilar metals such as copper, lead, or graphite. Water run-off from these materials is also prohibited.**

END OF SECTION

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SECTION 07550 - MODIFIED BITUMEN, TORCH APPLIED, ROOF SYSTEM

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Install a warranted modified bitumen, torch applied, roof system as indicated on the drawings, specified herein, and as needed for a complete installation, including but not limited to:
 - 1. Modified bitumen, torch applied, roof system;
 - 2. Sheet metal flashing and trim;
 - 3. Roof accessories;
 - 4. Installer's and Manufacturer's Warranty;
 - 5. Roof Warranty signs.

1.03 RELATED SECTIONS

- A. Section 07600 - Sheet Metal Flashing and Trim.

1.04 REFERENCES

- A. ANSI/ASTM D41 - Asphalt primer used in roofing, dampproofing, and waterproofing.
- B. ANSI/ASTM D312 - Asphalt used in roofing.
- C. ANSI/ASTM D2178 - Asphalt impregnated glass (felt) mat used in roofing and waterproofing.

1.05 SYSTEM DESCRIPTION

- A. Aluminized modified bitumen roof system installed over vapor barrier, glass base sheet and insulation.

1.06 SUBMITTALS - GENERAL

- A. Submit under provisions of Section 01300.
- B. Submit a typed list of all materials, manufacturers, etc., to be used on the project. Include brand name, size, color, etc.
- C. Submit cut sheets and manufacturer's product data on all specified materials.
- D. Submit manufacturer's installation instructions.
- E. Submit all necessary data to substantiate compliance with specifications when requested by Project Coordinator.

1.07 SUBMITTALS - SHOP DRAWINGS

- A. Submit all drawings as specified in this Section.
- B. All drawings shall have dimensions, drawn to scale, neat and legible, and with scale clearly indicated, and shall include walking protection board/ membrane layout to accommodate access to all mechanical equipment and clearstory windows.

1.08 SUBMITTALS - COLOR SAMPLES

- A. Submit samples of manufacturer's standard colors available when color is not specified

1.09 SUBMITTALS - MATERIALS SAMPLES

- A. Include with submittal when specified or requested by Architect to determine specification compliance.

1.10 SUBMITTALS - SHEETMETAL SAMPLES

- A. Provide 8" lengths of all sheetmetal items drawn or specified showing exact size, profile, hems, lap nesting, joinery, corners, terminations, etc.

1.11 SUBMITTALS - MANUFACTURER'S LETTER OF INTENT TO PROVIDE WARRANTY

- A. Submit a letter from the roof materials manufacturer indicating review of the specified roof system and related metal work is acceptable within the manufacturer's criteria for the required warranty.

1.12 SUBMITTALS: PROJECT CLOSEOUT

- A. Upon completion of all work and clean up, submit all items called for in Section 01700.
- B. Manufacturer's inspection report and acceptance of the roof assembly.

1.13 APPLICATORS: (Contractor Qualifications)

- A. Minimum of three years experience;
- B. Be approved by manufacturer of approved roof system;
- C. Contractor shall provide a list of three roof projects completed under the current company name, which are equal to or in excess of the size and scope of the proposed work. List shall include name, location and Owner's telephone number, to be furnished upon request.
- D. Specialize in modified bitumen, torch applied roof system application, equipment, and requirements.
- E. A photocopy of the roofing membrane manufacturer's current and valid "Approved Applicator" Certificate (must be an Approved Applicator at least three months prior to the bid date) for the approved roof system they intend to use on this project shall be submitted in accordance with SECTION 01300.

***NOTE: FAILURE TO COMPLY WITH THE ABOVE
(1.12) PROCEDURES SHALL RESULT IN THE
BID BEING DECLARED NON-RESPONSIVE.***

1.14 PRE-INSTALLATION CONFERENCE

- A. Coordinate and schedule after receipt of "Notice to Proceed" for the contract and approval of materials submittal.
- B. Convene one week prior to commencing work of this Section.
- C. Include the Architect/Owner's representatives, and all others concerned.
- D. May be at office of ETC Engineers & Architects or the job site.
- E. Review installation procedures and coordination required with all related Work.
- F. Before delivering any materials or equipment to the job site, necessary arrangements shall be made with the agency or physical plant representatives concerning vehicle access, on-site storage, protection of grounds, etc. Prior approval of set-up is mandatory before starting any work on a project. Installer is liable for any damage to the grounds. Improper delivery and/or storage of materials maybe cause for rejection.

1.15 DELIVERY AND STORAGE OF MATERIALS

- A. General: Deliver, store, and protect and handle products to site under provisions of Section 01500.
- B. Delivery:
 - 1. No materials are to be delivered to the site prior to approval of the materials submittal by the Architect.
 - 2. Deliver materials in Manufacturer's original containers, dry, undamaged, seals and labels intact.
 - 3. All roofing materials delivered for use on the job shall be as per approved materials submittal.
 - 4. All roofing materials shall be the products of, or approved by the manufacturer, of the roofing system specified.
- C. Storage and Handling:

1. Store products in weather protected environment, clear of ground and moisture.
2. Stand roll materials on end.
3. Storage of sheet materials (roll goods) and all insulation shall be subject to the following requirements:
 - a. If within fifty miles of Contractor's warehouse all sheet materials (roll goods), insulation, etc., shall be trucked to the job site daily from enclosed warehouse storage.
 - b. All other storage shall conform to the following:
 - i. Enclosed trailer, van or truck storage on the job site.
 - ii. Canvas (plastic sheeting is not acceptable) tarpaulins, with material on wooden pallets, 6 inches minimum above ground, secured by ropes, top and sides of all material protected from moisture and rain.

1.16 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply roofing membrane to wet, damp, or frozen deck surface.
- B. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

1.17 COORDINATION

- A. Coordinate the work with installing associated metal trim and metal flashing as the work of this Section proceeds.

1.18 PERFORMANCE REQUIREMENTS

- A. General: Install a watertight, modified bituminous membrane roofing and base flashing system with compatible components that will not permit the passage of liquid water and will stand wind loads, thermally induced movement, and exposure to weather without failure.

- B. FM Listing: Provide modified bitumen membrane, base flashing, and component materials that meet requirements of FM 4450 and FM 4470 as part of a roofing system and that are listed in FM's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM markings.

1. Roofing system shall comply with the following:

- a. Fire/Windstorm Classification: Class 1A-60.

- C. The facility should comply with Factory Mutual Global requirements. Provide a FMG Nav number, provided by manufacturer of specified system. Other manufacturers should also provide FMG Roof Nav numbers for their systems to be considered during the submittal phase of the project.

1. The roofing company awarded the contract should submit the roof system information to Affiliated FM for their review, compliance and approval prior to the design professional approving and accepting the system to be installed:

Local Contact:
Affiliated FM Dallas
Plan Review Department
5700 Granite Parkway, Suite 700
Plano, TX 75024

1.19 WARRANTY - INSTALLER'S

- A. Installer's warranty for a period of two years shall be furnished upon completion of all work, and as a condition to its acceptance, final payment and project closeout.
- B. Installer's warranty shall be issued on company's printed letterhead, agreeing to correct all leaks and defects in the roofing system to the satisfaction of the Owner and the manufacturer of the installed roof system.
- C. During the two-year warranty period, the Roofing Installer shall, upon notice from the Owner/Architect respond promptly to determine and repair source of leaks or defects at no cost to the Owner/Architect.

- D. Regardless of the cause of the leak or defect, the Owner/Architect and the Roofing Installer shall document and correspond as to the problem, location and corrective action needed or taken to prevent future similar occurrences.

1.20 WARRANTY - INSTALLER'S SIGNS

- A. Furnish and install Roof Warranty signs, 10 inches x 12 inches (minimum) size, made of .040 inch aluminum painted gloss white with gloss black lettering.
- B. Sign shall read: DO NOT MAKE REPAIRS OR ALTERATIONS TO THIS ROOF without written approval from the Owner or authorized representative. The roof is maintained until (insert the month and two years after the date of final acceptance) by (insert Contractor's name, address, and telephone number).
- C. Permanently post sign where directed by the Architect, prior to submission of, and as a condition for, final invoice and subsequent payment.

1.21 WARRANTY - MANUFACTURER'S

- A. Provide NDL or No Dollar Limit Warranty including Flashing Endorsement under provisions of Section 01740.
- B. Specified work shall be guaranteed by the Roofing Materials Manufacturer for the maximum term available (at least 12 years) with unlimited per square liability sum available starting from date of final acceptance by the Owner of the completed roofing system.
- C. The warranty shall be issued and approved by the Materials Manufacturer. Surety company bonds are not acceptable. Submit one copy of the roof warranty on Manufacturer's standard printed form to the Owner/Architect upon acceptance of the roof.
- D. Specified work shall be inspected by a qualified representative of the Manufacturer during its installation and at final completion, for conformance to Manufacturer's warranty program. A follow-up inspection shall be made by the Manufacturer sixty days (\pm) prior to expiration of Installer's two-year warranty.

- E. Installer's Responsibilities: Shall notify the Roofing Materials Manufacturer's representatives before commencing any work, review the project requirements with the Manufacturer's representatives prior to bidding, pay all required fees, secure all required inspections and do all things necessary to secure and deliver to the Owner the specified guarantee from the Manufacturer of the approved materials.
- F. During the Warranty Period, the Manufacturer shall, upon written notice from the Owner, investigate, report, and if covered by "Guarantee", permanently restore roof to watertight condition under terms of the guarantee within thirty days. Regardless of the cause of the leak or defect, the Owner/Architect and the Roofing Manufacturer shall document and correspond as to the problem location and corrective action needed or taken to prevent future similar occurrences.
- G. General Description of the Roof to be Covered by the Terms of the Manufacturer's Roof Warranty: Under this guarantee, the Manufacturer and/or Installer will make repairs necessary to correct roof leaks or roof system defects resulting from the following causes:
 - 1. Premature deterioration of part of the roofing system as a result of ordinary wear and tear by the elements;
 - 2. Improper workmanship on the part of the Roofing Installer;
 - 3. Blisters, bare spots, fish mouths, wrinkles, ridges, splits, or open seams not occasioned by structural failure of the roof deck or its supporting members;
 - 4. Slippage of any part of the roofing system.
 - 5. Breaks in flashing not occasioned by failure of any metal work.
 - 6. Wet insulation or decking damaged as a result of roof leaks attributed to defective material or workmanship. Shall be replaced with new.
 - 7. Ponding of water deeper than ½" in 48 hours.

- H. General Description of Roof Damage Covered by Terms of the Manufacturer's Roof Warranty: The Manufacturer's warranty, shall not cover any failure of the roof system or any part thereof as a result of the following causes:
1. Traffic or storage of materials thereon;
 2. Settlement, expansion, contraction, distortion, cracking or failure of the roof deck, coping walls, structural members or
 3. Distortion, expansion, or contraction of any unguaranteed flashing or wrinkles, ridges, or splits not occasioned by structural failure of the roof deck or its supporting members.
 4. Infiltration or condensation of moisture in, through or around the walls, copings, roof top equipment, building structure of underlying or surrounding materials unless corrective work was specified for these area;
 5. Lightning, wind storm, hail storm, tornadoes, floods, hurricane, vandalism or other natural disasters.

PART 2 - PRODUCTS

2.01 MANUFACTURERS - MEMBRANE MATERIAL SYSTEMS

- A. Firestone is the basis of design. Equivalent products of Certaineed, Inc., Bitec, Inc., John Manville, are acceptable. Any substitutions must be submitted as per Section 01300 and within 60 days of the start of construction as indicated by the date of the Notice to Proceed. The Architect shall be the judge of the Equivalency and acceptability of any substitutions.

2.02 MEMBRANE MATERIALS

- A. Asphalt and polymer modifiers of atactic polypropylene (APP) type, reinforced with non-woven polyester; smooth surfaced with aluminum coating torch applied.

2.03 SHEET MATERIALS

- A. Glass Fiber Ply Sheet: ANSI/ASTM D2178, Type IV.
- B. Glass Fiber Base Sheet D3672, Type II.

2.04 BITUMINOUS MATERIALS

- A. Asphalt Bitumen: ANSI/ASTM D312, Type III.
- B. Asphalt Primer: ANSI/ASTM D41, PS SS-A-790B.
- C. Asphalt Based Roof Cement: ASTM-D-4586, asbestos free industrial roof cement; summer or winter grade as required.

2.05 INSULATION

- A. Perlite, 3/4" x 4' x 8' maximum board size. Such as Fesco Board, by Johns Manville, or approved equal. Use maximum board size to facilitate bridging imperfections of the existing substrates below.
- B. 1-1/2" thick polyisocyanurate, 4'x 8' minimum board size, with fiber reinforced facers, such as H-Shield by Hunter Panels, Pyrox by Apache, or approved equal.
- C. Provide tapered units to create roof slope required.

2.06 BASE FLASHINGS

- A. Torch applied, modified bitumen.

2.07 CANTS & CRICKETS

- A. Fiber Cant and Tapered Edge Strips: ASTM C208 test; "Manville" "Flame Tamer", preformed to 45 degree angle, 1-1/2" X 4" nominal size.
- B. Use tapered insulation or perlite to form crickets.

2.08 ALUMINUM SURFACING

- A. ASTM D-2824, (which includes ASTM D-962) Asbestos free, Type II, Class A Flake pigment aluminum coating, with Energy Star requirements.

- B. Coating shall be applied by two-coat application. .
- C. Acceptable Manufacturers:
 - 1. Karnak #98, A.F.
 - 2. Flintcoat-A 300 by CertainTeed
 - 3. Firestone's Aluminum Fibrated Roof Coating

2.09 PENETRATION OR PITCH PAN SEALANT

- A. Pourable sealant; two component black neoprene rubber compound equal to W. R. Meadows or Lion Oil Co. "Pitch Pan Sealant".

2.10 PROTECTIVE WALKWAY PADS

- A. Product:
Firestone UltraPly TPO Premium Walkway Pads is specified. Other equivalent products may be submitted for approval two Weeks prior to bid according to Section 01300. Substitutions.
- B. Description: Non-reinforced thermoplastic material, 30" wide by 50'-0 long rolls. The pad has a textured surface and a smooth bottom surface for easy welding to roof membrane.
- C. Application:
 - 1. Insure membrane surface is clean, completely dry and free of debris.
 - 2. Cut the material into lengths that can be easily handled. Place the walkway pad over the roof membrane with the textured side up. After cutting, allow the pad to relax 1 to 2 hours before installation. The pad should be installed in 10'-0 long sections with a space between each section to allow for proper drainage. Lay the pad out so that it does not result in ponding water.
 - 3. Heat weld the perimeters of each walkway pad to the Membrane. For best tresults, weld when ambient temp. Is above 80 degrees F. Adhere center of each pad to the Membrane with bonding adheasive to reduce wrinkling Of the pad.

2.10 ACCESSORIES

- A. Roofing Nails: Galvanized or non-ferrous type, sizes as required to suit application.
- B. Termination Bars: Lucas L-90, aluminum with pre-punched holes.
- C. Mechanical Fasteners: Appropriate for purpose intended and approved by Factory Mutual and system manufacturer.
- D. Masonry (Expansion) Fasteners: "Rawl", "Lite Spike" with rust resistant finish 1/4" x 2" (minimum).
- E. Fasteners: Cadmium plated (rust resistant); 1/4" X length required; hex head screws with neoprene washers.
- F. Lead Jacks: 4.0#/square foot, hard lead, of adequate height to turn down into plumbing pipe 1" (minimum) with an 8" (minimum) integral flashing flange.
- F. Pipe/Conduit Supports: Eight inch lengths of treated 4"x 4" lumber spaced 36 inches on center (maximum).
- H. Wood Blocking, Nailers, Etc: Treated or wolmanized pine, 10 foot 0 inches, minimum lengths, nailed or bolted as required.
- I. Metal Paint (for rooftop penetrations): Exterior, Latex Enamel (Satin), Sherwin Williams best quality. Verify color with Owner's representatives.
- J. Caulking/Sealants: Urethane only! Equal to "Sonneborn" "Sonolastic NP-1"; match color of surrounding material. Must comply with Federal Specification II-5-0023OC, Type II, Class A; ASTM-C-920, types, Grade NS, Class 25, USE NT, M AND A.
- K. Installer's Warranty Sign: Ten inches high, fourteen inches wide, .040 inch thickness mill finish aluminum. Painted with white. gloss enamel, exterior latex paint, with gloss black exterior latex paint lettering.
- L. Sheet Metal Items: As specified in Section 07600.

PART 3 - EXECUTION

3.01 INSPECTION

- A. The Manufacturer's recommended installation procedures, when approved by the Architect, shall become the basis for inspecting and accepting or rejecting actual installation.
- B. Provide safe access to the roof for proper inspection by the Architect. Notify the Roofing Materials Manufacturer and arrange all necessary inspections in compliance with the requirements of the manufacturers warranty.
- C. Keep the Architect informed of the status of the project and schedule for completion.
- D. All roofing and flashing systems shall comply with the manufacturer's latest published manual for the designated system installed.
- F. Owner/Architect: Coordinate all roofing activities with the Installer's representative(s) designated at the Pre-Installation Conference.
- G. Installer's Representative (Job Superintendent):
 - 1. Designate a representative who will be responsible for, and follow the application of, all roofing work from start to finish.
 - 2. Attend the Pre-Installation Conference and be informed of the scope of the work and procedures for all corrective work.
 - 4. Shall have a complete set of drawings and specifications on the job at all times.

3.02 FIELD QUALITY CONTROL

- A. General: Request site attendance of roofing and insulation materials manufacturers during installation of the Work.

- B. Phased Construction: The installer shall not "phase" the application of the modified bitumen, torch applied roof system. All roof system components shall be applied consecutively as recommended by the manufacturer (within the limit of a day's work), and be weather tight so that in the event of inclement weather, no damage will occur to the roof components or interior of the building.
- C. Water Cut-Offs: Provide water cut-offs, at end of day's work and whenever inclement weather is imminent, at exposed edges of roof insulation. Where insulation is installed over metal decks, block flutes as required to prevent water from running under insulation. Remove water cut-offs before continuing with the installation of the roof insulation system.
- D. Corrective Work: All defects or irregularities noted during inspection shall be corrected. Finished roof membrane must be solid and tight. Inspect roof and make necessary corrections/repairs to ensure proper adhesion.
 - 1. Repair all burned areas. Lightly burned areas require re-saturation with extra modified bitumen mix. All other burned areas required full width patches over.
 - 2. Cut open, reheat and patch delaminated areas.
 - 3. Cut open, reheat and patch all blisters and voids.
- E. Roof Tests, Roof Cuts:
 - 1. Roof cuts will be requested only when considered absolutely necessary to determine compliance with specifications.
 - 2. When necessary, cut test samples of installed roofing as directed by the Owner's representative. Immediately repair roof to conform to adjacent construction without cost to the Owner.
 - 3. In the event that analysis of test samples or inspection indicates that the roof system, or a portion thereof, does not conform to the specifications the defected work shall be

corrected by removal and/or replacement, at no cost to the Owner.

3.03 SCHEDULING OF WORK

- A. Maintain building weatherproof at all times. Schedule and regulate all activities in order to complete each day's work in a weather-tight condition.
- B. Keep the Architect informed of schedules and procedures for the project.
- C. Schedule work so as to not be moving over, or hauling equipment over, finished areas of new work.

3.04 WEATHER LIMITATIONS

- A. Proceed with roofing and related work only when weather conditions will permit without "phasing" or extended exposure of the deck.

3.05 USE OF POWER DRIVEN EQUIPMENT

- A. Exercise good judgement in the use of all power driven or heavy equipment to prevent any damage to the roof system or interior of the building.

3.06 FIRE AND SAFETY PROTECTION EQUIPMENT

- A. Provide all necessary equipment, barricades, and flagging to protect the workmen performing the work as mutually agreed upon with the Owner/Architect during set-up. All equipment and work areas, particularly the asphalt kettle, ladders, scaffolding, and vehicles used in debris removal, shall be flagged or barricaded around.
- B. Provide a working fire extinguisher on the roof with each workman using a propane torch and on the ground at the portable asphalt kettle.

3.07 ACTUAL ROOF INSTALLATION:

**NOTE: THE CRITERIA FOR THE FOLLOWING ROOFING IS
BASED ON A 12 YEAR NDL, NO DOLLAR LIMIT
WARRANTY INCLUDING FLASHING ENDORSEMENTS
AS PER SECTION 01740.**

- A. Pre-finished metal edge coping should be in place before final “strip-in” membrane roofing begins along outside perimeter of roof area.
- B. Flashing, Counterflashing and other metal, should be in place as required for roofing.
- C. Install specified system consisting of multiple layers of 1-1/2" polyisocynurate insulation and 3/4" perlite to form the specified system. The first 3" above deck shall be level un-tapered. Balance to be tapered as required to achieve roof slopes. Each layer shall be set in a solid mopping of hot steep asphalt, and have joints staggered from the previous layer.
- D. Over the insulation system, install one ply of glass base sheet set in a saturation mopping of hot steep asphalt. DO NOT GLAZE COAT.
- C. Torch apply one layer of modified bitumen membrane material, as per manufacturer's requirements for a warranted roof system and as detailed.

**NO VOIDS, LOOSE MEMBRANE, SEAMS OR WRINKLES
WILL BE ACCEPTABLE!**

- F. Flash all conduit and piping penetrations with pitch pans as specified under SECTION 07600.
- G. Modified membrane and flashing installations shall meet all requirements of the manufacturer's warranty.
- H. Strip-in perimeter metal work as per manufacturers requirements.
- I. Coat finished roof and modified base flashings, after all accessories and weathering is completed, with a two-coat application of an approved aluminum roof coating material. Application shall not be less than 1-1/2 gal per 100 sf. of roof area.

- J. Install roof warranty signs as specified.

3.08 PARAPET WALL FLASHING - N/A

3.09 IMBEDDED ITEMS: Flash all embedded items, such as, but not limited to the following:

- A. Sheetmetal Work: Provide for the proper attachment of specified work to any roofing sheetmetal that is embedded in, or in contact with, and becomes an integral part of the specified roof systems.
 - 1. Lead jacks, Roof drains, Penetration pans and other flashings as required for mechanical equipment, antenna's, piping, electrical conduits, etc., which pass through roof system.

3.10 INSTALLATION - INSULATION

- A. Ensure deck is clean, dry and flat/level.
- B. Over the prepared deck install multiple layers of 1-1/2" polyisocynurate board. Complete installation with tapered insulation layers as necessary to achieve required slopes at 1/4" per ft. slope. There shall be a minimum of 3" of insulation at the roof drains.
- C. Stagger all insulation joints of overlay layers and set in solid moppings of hot steep asphalt.
- D. Lay insulation boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- D. Apply no more insulation than can be sealed with membrane in same day.

3.11 INSTALLATION - MEMBRANE

- A. Install in accordance with the approved Roofing Materials Manufacturer's latest published manual for the slope and type of substrate indicated.

- B. Torch apply roof membrane according to manufacturer's published recommendations and specifications. Method of installation shall be discussed at the pre-roofing conference.
- C. All membrane shall be properly lapped with square cut ends, free of wrinkles, air pockets, blisters, ridging, fishmouths, tears, loose edges, etc.
- D. Overheated material shall be cut out or covered over with new material. All edges of the membrane shall be torched and troweled according to manufacturer's specifications. All flashing and membrane shall be applied neat, in an orderly, uniform fashion, using skilled workmen familiar with the process and materials.
- E. Seal membrane around all roof penetrations.

3.12 INSTALLATION - BASE FLASHING

- A. Install base flashing at all projections, curbs, vents and penetrations, etc., as required to complete the roof in compliance with the manufacturer's requirements for a warranted roof system.

3.13 INSTALLATION - PENETRATION PANS

- A. Penetration pans fabricated from .040 aluminum with leak proof corners shall be not more than 3" high and sized to the penetration with a minimum 2" clearance all sides.
- B. Set pans on a bead of melted down modified bitumen.
- C. Fill pan to within 1/2" of top with Foam Urethane and top cover with Lion Oil Co., W. R. Meadows or other approved (Two Component) Pitch Pans Sealer sloped to shed water.

3.14 INSTALLATION - LEAD JACKS

- A. Sized correctly to pipe size.
- B. Fold down neatly into top of pipe; 1" minimum.
- C. Flash and seal as per manufacturer's recommendations.

3.15 INSTALLATION - ALUMINUM ROOF COATING

- A. Do not apply coating before completion of final inspection punch list.
- B. Allow all sections of roof membrane to weather as per manufacturer's requirements, (minimum 30 - 60 days).
- C. Hose or sweep roof surface clean before surfacing.
- D. Roof surfaces shall be clean and dry 24 hrs. (minimum) before installation.
- E. Apply a uniform roof coating in two separate applications, at the rate of 1-1/2 - 2 gallons/100 sq. ft.(total coverage).
- F. All material shall be well mixed as per manufacturer's recommendations.
- G. Use of a nappy, roller brush, in lieu of broom, squeegee or spray, is strongly recommended.
- H. Do not use coating to paint roof penetrations.
- I. Clean all coating from adjacent finishes, fascia material, etc.
- J. Mask or protect adjacent surfaces.
- K. Schedule application to avoid foot traffic over completed portions. Clean-up and re-coating will be required if damaged by Contractor's workmen.

3.16 PROTECTION AND CLEAN-UP OF ROOFTOP, BUILDING AND GROUNDS

- A. Rooftop Protection and Clean-up:
 - 1. Protect roof surfaces over which work is to be performed.
 - 2. Exercise care and caution that roofing materials placed on rooftop. Do not overload structure, damage decking or rooftop equipment.

3. Take care to prevent bitumen, aggregate, and debris from running into and clogging roof drains and water conductors. Remove trash and debris promptly.
4. Schedule work in order not to track over and damage newly installed roofing in place. If absolutely necessary to cross a newly applied roof area, coordinate exact procedures with the Architect.
5. The Installer shall be responsible for all damage to any related items to his trade and will be responsible for the cleaning and repair or replacement of any such items.

B. Building Protection and Clean-up:

1. Properly and efficiently protect building and work of other trades from damage by roofing materials during the performance of the work.
2. Protect building walls and other surfaces from disfiguration by bitumen stains, runs or spillage, etc. The Installer shall bear the labor and material cost of repair of these surfaces.

C. Grounds Protection and Clean-up:

1. Coordinate access, parking, storage of materials and equipment on the grounds with the Owner's representatives designated at the Pre-Installation Conference.
2. Protect the grounds, lawn, landscaping, shrubbery, etc..., from abuse and damage during the roofing work.
3. Remove trash, debris, wrapping, equipment etc., promptly and clean up daily around the job site.

END OF SECTION

SECTION 07600 - FLASHING AND SHEET METAL

PART 1 - GENERAL

RELATED DOCUMENTS

- 1.1** A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SCOPE

- A. Provide all sheet metal work, complete, including break metal eave and fascia configurations at perimeter of roof, as well as flashing and counter-flashing and installation of flashing at mechanical work penetrations.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Sealants; Section 07900.
B. Thru-wall flashing @ exterior sheathed walls- Section 09250.

1.4 SHOP DRAWINGS

- A. Comply with Section 01300. Prior to fabrication, submit shop drawings for each typical sheet metal item indicating materials, gages, jointing, and fastening.

1.5 JOB CONDITIONS

- A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of the work and protection of materials and finishes.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Sheet Metal: 22 gauge Galvalume Plus finished sheet metal, especially at eave and fascia configurations around perimeter of roofs.
B. Aluminum Sheets: ASTM B 209, alloy 3003, temper #14, mill finish.
C. Nails, Screws, and Rivets: Same metal as flashing/sheet metal or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with materials being fastened.
D. Solder: ASTM B32, 50% tin and 50% lead, used with rosin flux.
E. Roofing Cement: ASTM D4586, Type I.
F. Bitumastic Coating: F.S. TT-C-494, MIL-C-18480, or SSPC - Paint 12, cold applied solvent type bitumastic coating for application in dry film thickness of 15 mils per coat.

G. Metal Accessories: Sheet metal clips, cleats, straps, anchoring devices and similar

- accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gage required for performance.
- H. Sealants: As specified in Section 07900.
 - I. Epoxy Seam Sealer: 2-part noncorrosive metal seam cementing compound, recommended by manufacturer for non-moving joints including riveted joints.
 - J. Paper Slip Sheet: 5-lb. rosin-sized building paper.
 - K. Polyethylene Underlayment: 6 mil carbonated polyethylene film.

2.2 FABRICATION

- A. Fabricate metal eave and fascia configurations around perimeter of roofs, metal flashings, counter-flashings, trim and similar items to comply with the profiles and sizes indicated. Fabricate to comply with "SMACNA Architectural Sheet Metal Manual", metal manufacturer's recommendations, and recognized industry practices. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of the work. Form work to fit substrates. Comply with material manufacturer's instructions and recommendations. Form exposed sheet metal work without excessive oil-canning, buckling and tool marks, true to line and levels as indicated, with exposed edges folded back to form hems. Fabricate work of the following metals:
 - 1. Flashing, Counterflashing, and fascia and soffit Trim Exposed to View: 22 gage material with Galvalume finish.
 - 2. Flashing and Counterflashing Concealed from View: .032" thick aluminum.
- B. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. For metal other than aluminum, tin edges to be seamed, form seams, and solder. Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.
- C. Expansion Provisions: Where lapped or bayonet-type expansion provisions cannot be used, or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1" deep, filled with mastic sealant (concealed within joints).
- D. Separate dissimilar metals from each other by painting each metal surface in area of contact with a heavy application of bitumastic coating, or by other permanent separation as recommended by manufacturers of dissimilar metals.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine substrates and conditions under which metal flashing and trim will be installed. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. SMACNA Details: Except as otherwise indicated or specified, comply with applicable

recommendations and details of "Architectural Sheet Metal Manual" by
Manufacturer's Recommendations: Except as otherwise indicated or Specified, comply
with recommendations and instructions of manufacturer of sheet metal being
installed.

- B. Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints and seams which will be permanently watertight and weatherproof.
- C. Underlayment: Where aluminum is to be installed directly on cementitious or wood substrates, install a course of paper slip sheet and a course of polyethylene underlayment.
- D. Bed flanges of work in a thick coat of bituminous roofing cement where required for waterproof performance.
- E. Roofing Cement Edges: Where indicated, seal edges of metal flashings to substrates with roofing cement; install bed or bead of cement in manner which will maintain a watertight seal.

3.3 CLEAN-UP

- A. After completion of work, clean roofing cement, sealant and bituminous paint from flashing, floors, and all surfaces so defaced. Remove all excess materials and scraps from the job and leave all surfaces neat and clean.

END OF SECTION

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SECTION 07900 - JOINT SEALANTS

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 SCOPE

- A. Completely close with sealant all joints. Include joints around frames of doors, windows, or other openings in exterior walls, flooring joints, joints at penetrations of walls, decks, and floors by piping and other services and equipment, joints between items of equipment and other construction, and other joints indicated or specified to be sealed.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Aluminum Entrances And Storefront; Section 08410.
- B. Highway Department Standards for Roadways
- C. Modified Bitumen Roofing; Section 07550

1.4 QUALITY ASSURANCE

- A. Obtain elastomeric materials only from manufacturer who will, if required, send a qualified technical representative to project site, for the purpose of advising the installer of proper procedures and precautions for the use of the material.

1.5 SUBMITTALS

- A. Comply with Section 01300.
- B. Product Data: Submit manufacturer's specifications, recommendations, and installation instructions for each type of sealant and miscellaneous materials. Include letter of certification, or certified test laboratory reports indicating that each material complies with the requirements and is intended for the applications indicated.
- C. Samples: Submit 12" long sample of each color required (except black) for each type of sealant exposed to view. Samples will be viewed for color only.
- D. Provide Compatibility Statement & Certification for each type of sealant.

1.6 JOB CONDITIONS

- A. Examine joint surfaces, backing, and anchorage of units forming sealant rabbet. Do not proceed with work until unsatisfactory conditions have been corrected.

- B. Do not proceed with installations of sealants under adverse weather conditions, or when temperatures are above or below manufacturer's recommended limitations for installation. Proceed with the work only when forecasted weather conditions are favorable for proper cure and development of high early bond strength.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by testing and field experience.
- B. Provide in colors as selected by Architect from manufacturer's standard colors.

2.2 ELASTOMERIC JOINT SEALANTS

- A. Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated with complies with ASTM C 920 requirements, including those for Type, Grade Class, and Uses.
 - 1. Two-Or-More Component Nonsag Urethane Sealant: Type M, Grade NS, Class 25. Tremco "Dymeric", Sonneborn "Sonolastic NP 2", Bostik "Chem-Calk 500", Pecora "Dynatrol II", or Mameco "Vulkem 922".
 - 2. Two-Component Pourable Urethane Sealant: Type M, Grade P, Class 25. Tremco "THC 900", Sonneborn "Sonolastic SL2", Bostic "Chem-Calk 550", Pecora "NR-200 Urexpan", or Mameco "Vulkem 245".
 - 3. One-Component Mildew-Resistant Silicone Sealant: Type S, Grade NS, Class 25. GE "SCS 1702", Dow Corning "786", Tremco "Proglaze White", or Pecora "898".
 - 4. Glazing system perimeter framing; Dow Silicone 795.

2.3 ACRYLIC EMULSION SEALANT

- A. One component, nonsag, acrylic, paintable, complying with ASTM C 834.
 - 1. Tremco "Acrylic Latex 834", Sonneborn "Sonolac", Pecora Corp. "AC-20", or Bostik "Chem-Calk 600".

2.4 MISCELLANEOUS MATERIALS

- A. Joint Cleaner: Type of joint cleaning compound recommended by sealant manufacturer for joint surfaces to be cleaned.
- B. Joint Primer/Sealer: Type recommended by the sealant manufacturer for the joint surfaces to be primed or sealed.
- C. Bond Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer, to be applied to sealant-contact surfaces where bond to the substrate or joint filler must be avoided for proper performance of sealant. Provide self-adhesive tape wherever applicable.
- D. Sealant Backer Rod: Compressible rod stock closed cell polyurethane foam. Provide size and shape of rod which will control joint depth for sealant placement, break bond of sealant at bottom of joint, form optimum shape of sealant bead on back side, and

provide a highly compressible backer to minimize the possibility of sealant extrusion when joint is compressed.

PART 3 - EXECUTION

3.1 JOINT TYPES AND USAGES

- A. Acrylic Emulsion Sealant: All interior joints except joints with metal, aluminum, ceramic tile and wet work.
- B. Urethane Sealants: Multi-component. All exterior joints and interior joints with aluminum or metal. Use minimum 35 Shore A hardness urethane sealant for horizontal joints subject to pedestrian and vehicular traffic.
- C. Silicone Sealants: Use mildew resistant silicone sealant at ceramic tile, sinks, plumbing fixtures and other wet work.

3.2 JOINT SURFACE PREPARATION

- A. Clean joint surfaces immediately before installation of sealant. Remove dirt, insecure coatings, moisture, and other substances which would interfere with bond of sealant.
- B. For elastomeric sealants, do not proceed with installation of sealant over joint surfaces which have been painted, lacquered, waterproofed or treated with water repellent or other treatment or coating. Remove coating or treatment from joint surfaces before installing sealant.
- C. Etch concrete and masonry joint surfaces to remove excess alkalinity. Etch with 5% solution of muriatic acid; neutralize with diluted ammonia solution, rinse thoroughly with water and allow to dry before sealant installation.
- D. Roughen joint surfaces on vitreous coated and similar non-porous materials, wherever sealant manufacturer's data indicates lower bond strength than for porous surfaces. Rub with fine abrasive cloth or wool to produce a dull sheen.

3.3 INSTALLATION

- A. Comply with sealant manufacturer's printed instructions, except where more stringent requirements are indicated or specified and except where manufacturer's technical representative directs otherwise.
- B. Prime or seal the joint surfaces wherever shown or recommended by the sealant manufacturer. Do not allow primer/sealer to spill or migrate onto adjoining surfaces.
- C. Install sealant backer rod for liquid elastomeric sealants, except where shown to be omitted or recommended to be omitted by sealant manufacturer for the application shown.
- D. Install bond breaker tape wherever shown and wherever required by manufacturer's recommendations to ensure that elastomeric sealants will perform properly.
- E. Employ only proven installation techniques, which will ensure that sealants will be deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of the joint bond surfaces equally on opposite sides. Except as otherwise indicated, fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface and a vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt.

- F. Install sealants to depths as shown or, if not shown, as recommended by the sealant manufacturer but within the following general limitations, measured at the center (thin) section of the bead.
 - 1. For sidewalks and similar joints sealed with elastomeric sealants and subject to traffic and other abrasion and indentation exposures, fill joints to a depth equal to 75% of joint width, but neither more than 5/8" deep nor less than 3/8" deep.
 - 2. For normal moving joints sealed with elastomeric sealants, but not subject to traffic, fill joints to a depth equal to 50% of joint width, but neither more than 1/2" deep nor less than 1/4" deep.
 - 3. For joints sealed with non-elastomeric sealants, fill joints to a depth in the range of 75% to 125% of joint width.
- G. Do not allow sealants to overflow or spill onto adjoining surfaces. Use masking tape or other precautionary devices to prevent staining of adjoining surfaces, by either the primer/sealer or the sealant.
- H. Remove excess and spillage of sealants promptly as the work progresses. Clean the adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage, without damage to the adjoining surfaces or finishes.

3.4 CURE AND PROTECTION

- A. Cure sealants in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength, and surface durability. Cure and protect sealants in a manner which will minimize increases in modulus of elasticity and other accelerated aging effects. Replace or restore sealants which are damaged or deteriorated during construction period.

END OF SECTION

SECTION 08110 - HOLLOW METAL DOORS AND FRAMES

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. Section Includes:

1. Standard and custom hollow metal doors and frames.
2. Steel sidelight, borrowed lite and transom frames.
3. Louvers installed in hollow metal doors.
4. Light frames and glazing installed in hollow metal doors.

- B. Related Sections:

1. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
2. Division 08 Section "Door Hardware".
3. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.

- C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
9. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
10. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
11. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.

12. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
13. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
14. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Include the following:
 1. Elevations of each door design.
 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 4. Locations of reinforcement and preparations for hardware.
 5. Details of anchorages, joints, field splices, and connections.
 6. Details of accessories.
 7. Details of moldings, removable stops, and glazing.
 8. Details of conduit and preparations for power, signal, and control systems.
- D. Samples for Verification:
 1. Samples are only required by request of the architect and for manufacturers that are not current members of the Steel Door Institute.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.
- B. Quality Standard: In addition to requirements specified, comply with ANSI/SDI A250.8, latest

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. CECO Door Products (C).
 2. Curries Company (CU).
 3. Steelcraft (S).

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

2.3 HOLLOW METAL DOORS

- A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.
- B. Exterior Doors: Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Design: Flush panel.
 - 2. Core Construction: Manufacturer's standard polystyrene. Where indicated, provide doors fabricated as thermal-rated assemblies with a minimum R-value of 2.8 or better.
 - 3. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.
 - 4. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
 - 5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
 - 6. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- C. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Design: Flush panel.
 - 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, or one-piece polystyrene core, securely bonded to both faces.
 - 3. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18
 - 4. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet.
 - 5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
 - 6. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- D. Manufacturers Basis of Design:
 - 1. CECO Door Products (C) Polystyrene Core - Legion Series.
 - 2. Curries Company (CU) - Polystyrene Core - 707 Series.

2.4 HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.
 - 1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
 - 2. Manufacturers Basis of Design:
 - a. CECO Door Products (C) – SU Series.
 - b. Curries Company (CU) – M Series.
- C. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.
 - 1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
 - 2. Manufacturers Basis of Design:
 - a. CECO Door Products (C) - SU Series.
 - b. Curries Company (CU) - M Series.
- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 - 2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.
 - 3. Compression Type for Drywall Slip-on (Knock-Down) Frames: Adjustable compression anchors.
- B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.

2.6 ACCESSORIES

- A. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.7 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant.

B. Hollow Metal Doors:

1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.

C. Hollow Metal Frames:

1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
3. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
4. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
5. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
6. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
7. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
8. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
 - b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - 5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.

9. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
- D. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.8 STEEL FINISHES

- A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.
 1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.

- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
 - 1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
 - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
 - 4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
 - 1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

END OF SECTION

SECTION 08331 – OVERHEAD ROLLING SERVICE DOOR

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 types of overhead coiling doors:
 - 1. Manually operated, galvanized steel, uninsulated assembly, primed, to be field painted.
- B. Related Sections include the following:
 - 1. Division 8 Section "Door Hardware" for lock cylinders and keying.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide overhead coiling doors capable of withstanding the effects of gravity loads and loads without evidencing permanent deformation of door components.
- B. Wind Loading: Supply doors to withstand up to 20 psf maximum wind load.
- C. Door Slat Material: Galvanized steel, primed, with flame spread Index of 0 and a smoke developed index of 10 as tested per ASTM E84.

1.4 SUBMITTALS

- A. Product Data: For each type and size of overhead doors and accessory. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes. Provide roughing-in diagrams, operating instructions, and maintenance information. Include the following:
 - 1. Setting drawings, templates, and installation instructions for built-in or embedded anchor devices.
- B. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's data sheets. **DO NOT SUBMIT SHOP DRAWINGS UNTIL THE SITE CONDITIONS HAVE BEEN VERIFIED BY THE INSTALLER. SHOW AND ADDRESS ALL SPECIAL CONDITIONS ON THE SHOP DRAWING SUBMITTALS.**
- C. Samples for Verification: Of each type of exposed finish required, prepared on samples of size indicated below and of same thickness and material indicated for Work. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
- D. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

- E. Provide manufacturer's standard written warranties for each door and grille installed.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who is an authorized representative of the overhead door manufacturer for both installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain overhead doors through one source from a single manufacturer.
 - 1. Obtain operators and controls from the overhead roll-up door manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Overhead Door Corporation, P.O. Box 809046 Dallas, Texas 75380. (1-800-887-3667. Overhead Door is basis of design. Other door companies must be judged to be equal and acceptable after evaluation by the Architect. Any substitutions must be submitted as per Section 01300 and within 60 days of the start of construction as indicated by the date of the Notice to Proceed.

2.2 DOOR SERIES

Overhead Door Series 625, primed,galvanized steel, overhead coiling door, face of wall mounted.

2.3 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Door Curtain: Fabricate overhead door curtain of interlocking slats, designed in a continuous length for width of door without splices. Endlocks shall be attached to each end of alternate slats to prevent lateral movement.
 - 1. Galvanized steel door curtain slats: Flat profile type F-2651.
- B. Finish: Galvanized steel; slats and hood shall be 18 ga. galvanized steel, primed.
- C. Windload Design: 20PSF
- D. Bottom Bar: Consisting of 2 steel angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick. See Hardware Schedule for additional information regarding required locks. The bottom bar must be designed to lock both door jambs from one lock device.
- E. Curtain Jamb Guides: Fabricate curtain jamb guides of three steel angles, with minimum thickness of 3/16". Guides shall be weatherstripped with a vinyl weather seal at each jamb, on the exterior side.
- F. Counterbalance: Helican torsion spring type designed for standard 50,000 cycle life design. Countrbalance shall be housed in a steel tube or pipe barrel, supporting the curtain with deflection limited to 0.03" fer foot of span. Countrbalance shall be adjustable by means of an adjusting wheel.

2.4 HOODS AND ACCESSORIES

- A. Hood: Form to entirely enclose roll-up curtain and operating mechanism at opening head and act as weatherseal. Contour to suit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sag.
 - 1. Fabricate hood for metal door of not less than 24 gauge, galvanized steel with painted finish.
 - 2. Shape: Round.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. General: Install door and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's written instructions, and as specified.

3.2 ADJUSTING

- A. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.

END OF SECTION

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SECTION 08410 - ALUMINUM FRAMING

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 SCOPE

- A. Provide the various types of aluminum framing systems and windows complete.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Glass and glazing requirements; Section 08800.
- B. Aluminum Swinging Doors, Section 08901
- C. Section 07900 for sealant installation procedures.

1.4 SUBMITTALS

- A. Comply with Section 01300.
- B. Shop Drawings: Submit shop drawings for the fabrication and installation of framing and associated components. Include wall elevations at 1/2 scale, and half size detail sections of every typical composite member. Show anchors, joint system, expansion provisions, glazing and sealing details, finishes.
- C. Warranty: Submit executed warranty.
- D. Samples: Submit sample of finish and glass specified for Architect's verification.
- D. Product data for sealants and compatibility statement, and manufactures' approval of installer.

1.5 WARRANTY

- A. Submit a warranty signed by the manufacturer, contractor, and installer, agreeing to replace glazing which fail in materials and workmanship within 2 years of the date of acceptance. Failure of materials or workmanship shall include, but not be limited to, excessive leakage of air infiltration, excessive deflections, delamination of panels, deterioration of finish or metal in excess of normal weathering, and defects in accessories, and other components of the work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Kawneer is specified for System 1, as basis of design. Equivalent systems of Oldcastle, US Aluminum, and YKK are acceptable. EFCO is specified for System 2 and 3. Any substitutions must be submitted as per Section 01300 and within 60 days of the start of construction as indicated by the date of the Notice to Proceed. The Architect shall be the judge of the equivalency and acceptability of any substitution requests.

- B. Sealant System: Dow 795 silicone with closed cell backer rod.

2.2 FRAMING

System 1 : (Exterior), Kawneer TriFab VG 451, 2" X 4-1/2" framing members designed for front plane glazing applications, with 1" insulated glass units. Finish of aluminum shall be clear anodized.

System 2 Concession Window: EFCO Series 601, AW-PG75-H Single Hung upward acting w/ the EFCO, Series 6615 AW-PG100-FW fixed window with grids. Complete with hardware and related components.
Glazing: 1" insulated glass with a surface coating of PPG Solarban 60 on the no. 2 surface.

System 3: Building windows with round tops: Shall be EFCO Series 590X window with grids. Complete with hardware and related components.
Glazing: 1" insulated glass with a surface coating of PPG Solarban 60 on the no. 2 surface.

Note: Provide interior lites of opaque glass of Pattern 62 at the window at the Men and Women's toilets only.

2.3 FINISH

- A. Kawneer #14 Clear Anodized Aluminum, Aluminum Association Specification, AA-M12C22A41, Architectural Class 1. Anodic finishes shall meet the requirements of the Aluminum Association DAF-45 and AAMA 611 for anodized architectural aluminum.
- B. EFCO Window finish shall be liquid fluoropolymer aluminum extrusion coatings, AAMA 2605-20. Minimum 70 percent PVDF resin by weight, in color coat. Color as selected from the EFCO Ultrapon Color Card by Architect.

2.4 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for a complete, weathertight, and proper installation of framing systems, subject to acceptance by Architect.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in compliance with manufacturer's specifications, recommendations and final shop drawings.
- B. Set units plumb, level and true to line, without warp or rack of framing. Anchor securely in place. Secure to structure with non-staining, non-corrosive shims, anchors, fasteners, spacers, and fillers. Use care in erection so as not to mar, abrade, or stain finished surfaces.
1. Seal frames with an approved sealant in color to match frames, making a neat fully weatherproof job. Refer to Section 07900, and comply with requirements

of that section. Clean and prime surfaces as required by manufacturer for sealant adhesion.

- C. Paint concealed contact surfaces of dissimilar materials, including metal in contact with masonry or concrete work, with heavy coating of bituminous paint, or provide other separation as recommended by manufacturer.

3.2 CLEANING

- A. Clean metal surfaces promptly after installation, exercising care to avoid damage to coatings.
- B. Clean glass surfaces after installation. Remove excess glazing and sealant compounds, dirt, and other substances.

3.3 PROTECTION

- A. Institute protective measures required throughout remainder of construction period to ensure that units will be without damage or deterioration, other than normal weathering, at time of acceptance.

END OF SECTION

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SECTION 08800 - GLAZING

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 SCOPE

- A. Provide glass and glazing, complete, for each of the specific types of glazing systems specified for this project.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

None

1.4 QUALITY ASSURANCE

- A. Provide safety glass (tempered, laminated) complying with requirements of ANSI Z97.1 and CPSC 16 CFR 1201 CII.
- B. Label each piece of glass designating type and thickness of glass. Do not remove label prior to installation.
- C. Permanently identify each unit of tempered glass. Etch or ceramic fire identification on glass; identification shall be visible when unit is glazed.

1.5 SUBMITTALS

- A. Comply with Section 01300.
- B. Product Data: Submit copy of manufacturer's specifications and installation instructions for each type of glass and glazing material. Include test data or certification substantiating that glass complies with specified requirements.
- C. Samples: Prior to ordering, submit minimum 6" x 6" sample of each type and thickness of glass required for review by Architect.

1.6 PROTECTION

- A. Protect glass surfaces and edges at all times during the construction period. Keep glass free from contamination by materials capable of staining glass.

PART 2 – PRODUCTS

2.1 MANUFACTURER

- A. PPG Industries, Inc. is the basis of design. Other manufacturers may be equal and acceptable. Any substitutions must be submitted as per Section 01300 and within 60 days of the start of construction as indicated by the date of the Notice to Proceed. The Architect shall be the judge of the equivalency and acceptability of any substitutions.

2.2 SEALED INSULATED UNITS/GLASS MATERIALS AND PRODUCTS

- A. Preassembled units consisting of organically sealed lites of glass separated by dehydrated air spaces complying with ASTM E 774 and with other specified requirements.

V-1: 1" Insulated Vision Unit:

- Outer lite, 1/4" clear float glass. Tempered where required by codes..
- 1/2" air space.
- Inner lite, 1/4" clear float glass. Tempered where required by codes.

2.3 GLAZING MATERIALS

- A. Provide materials with proven record of compatibility with surfaces contacted in installation.
1. Glazing Sealants: Tremco "Proglaze", Bostik Chem-Calk 1200", Pecora "836", Sonneborn "Omniglaze", or other approved by system manufacturer.
 2. Glazing Gaskets: Structural rubber, molded neoprene, or cellular neoprene as recommended by manufacturer of glazing system.
 3. Glazing Tape: Bostik "Chem Tape 60", Pecora "Shim-Seal", or Tremco "Pre-shimmed Tremco 440 Tape".
 4. Setting Blocks: Neoprene or other resilient blocks of 70 to 90 Shore A durometer hardness, adhesively backed on one face only, tested for compatibility with specified glazing sealants.
 5. Spacers: Neoprene or other resilient blocks of 40 to 50 Shore A durometer hardness, tested for compatibility with specified glazing sealant.
 6. Compressible Filler Rod: Closed-cell or waterproof-jacketed foam of polyethylene, butyl rubber, neoprene, polyurethane or vinyl, tested for compatibility with specified glazing sealants, of 5 to 10 psi compression strength (25% deflection), recommended by sealant manufacturer for use in glazing channel to prevent sealant exudation from the channel.
 7. Mirror Mastic: An adhesive setting compound, produced specifically for setting mirrors by spot application method (25% coverage) without support, to be used in 1/8" to 1/2" thickness.

PART 3 - EXECUTION

3.1 PERFORMANCE REQUIREMENTS

- A. Watertight and airtight installation of each piece of glass is required. Each installation must withstand normal temperature changes, wind loading, impact loading (for operating doors) without failure of any kind including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glazing materials, and other defects in work. The design wind speed criteria shall be 90 mph.

3.2 INSTALLATION

- A. Comply with recommendations of glass manufacturers and manufacturers of sealants and other glazing materials, unless otherwise indicated or specified, including preparation of surfaces.
- B. Clean channel surfaces and prime as recommended by sealant manufacturer.
- C. Cut glass to size as required for measured opening, provide adequate edge clearance and glass bite all around. Cut prior to tempering.
- D. Do not install sheets which have edge damage or face imperfections.
- E. Miter-cut and bond (weld) ends of channel gaskets at corners to provide a continuous gasket.
- F. Seal face gaskets at corners with liquid elastomeric sealant to close openings and prevent withdrawal of gaskets from corners.
- G. Remove and replace glass which is broken, chipped, cracked, abraded or damaged during construction period.

3.3 CURING

- A. Cure glazing sealants and compounds in compliance with manufacturer's instructions and recommendations to obtain high early bond strength, internal cohesive strength and surface durability.

END OF SECTION

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SECTION 08901 - ALUMINUM SWINGING DOORS

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 SCOPE

- A. Provide aluminum swinging doors, glass and glazing, and hardware.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Aluminum Framing System 1, Section 08410.
- B. Lock cylinders and panic devices; Section 08700.

1.4 SUBMITTALS

- A. Comply with Section 01300.
- B. Shop Drawings:
 - 1. Doors: Submit shop drawings for the fabrication and installation of doors, framing and associated components. Include wall elevations at 1/2 scale, and half size detail sections of every typical composite member. Show anchors, joint system, expansion provisions, glass enclosure, glazing and sealing details, finishes, speed control units, and hardware.
- C. Samples: If requested, submit sample of specified finish on aluminum for Architect's verification.
- D. Maintenance Instructions: Submit manufacturer's maintenance and service instructions for adjustment, operation, and maintenance of revolving door. Include instructions for maintenance of finish.
- E. Warranty: Submit executed warranty.

1.5 WARRANTY

- A. Provide written 2 year warranty, signed by Contractor and Installer, agreeing to repair or replace defective materials and workmanship.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Kawneer is specified as the basis of design, equivalent systems from Oldcastle, Efco or U S Aluminum are acceptable. Any substitutions must be submitted as per Section 01300 and within 60 days of the start of construction as indicated by the date of the Notice to Proceed. The Architect shall be the judge of the equivalency and acceptability of any substitution request.

2.2 SWINGING DOORS

- A. Exterior Doors; Kawneer 350 Medium Stile doors, 3-1/2" vertical stiles, 3-1/2" top and 6-1/2" bottom rail. Offset pivots, surface mounted closures.
- B. Hardware:
 - 1. Pull: 1" diameter round bent bar with 90 degree offset (3-1/2"+), 12" length center to center.
 - 2. Closers: Shall be rated for the size and weight of the door it is matched with.
 - a. Regular 3'-0 x 7'-0 entrance door; LCN 4040 Super Smoothee
 - b. Taller 3'-0 x 8'-4 entrance doors;
 - c. Closures for H.M. exterior and interior doors shall be listed in the Hardware Schedule, Section 08700.
 - 3. Pivots: Manufacturer's standard top, intermediate and bottom offset pivots.
 - 4. Threshold: Manufacturer's with anchors and clips, coordinate with offset pivots and closer. Maximum 1/2" height. Thresholds shall be ADA compliant.
 - 5. Weatherstripping; Thermoplastic elastomer weathering on tubular shape with semi-rigid polymeric backing, or EPDM blade gasket sweep strip applied with concealed fasteners.
 - 6. Locks; Adams Rite MS 1850 deadlock (active leaf) and one pair flush bolts (inactive leaf).
 - 7. Panic hardware shall be scheduled on the Hardware Schedule for egress doors.
- D. Glazing: 1/4" thick float, tempered, meeting requirements specified in Section 08800.

2.3 FINISH

- A. Clear anodized to match aluminum glass setting system.

2.4 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for a complete, weathertight, and proper installation of doors and framing systems, subject to acceptance by Architect.

PART 3 – EXECUTION

3.1 INSTALLATION – DOORS

- A. Set units plumb, level and true to line, without warp or rack of doors and framing. Anchor securely in place. Secure to structure with non-staining, non-corrosive shims, anchors, fasteners, spacers, and fillers. Use care in erection so as not to mar, abrade, or stain finished surfaces.
 - 1. Seal frames with an approved sealant in color to match frames, making a neat fully weatherproof job. Refer to Section 07900 & 08800 and comply

with requirements of that section.

- B. Paint concealed contact surfaces of dissimilar materials, including metal in contact with masonry or concrete work, with heavy coating of bituminous paint, or provide other separation as recommended by manufacturer.

3.2 ADJUSTING

- A. Adjust doors to provide tight fit at contact points and weatherstripping, for smooth operation and weathertight closure, and to operated smoothly with hardware and operators functioning properly. Lubricate hardware and other moving parts.

3.3 CLEANING

- A. Clean completed system, inside and out, promptly after erection and installation of glass and sealants, allowing for normal curing of sealants. Protect systems from damage and deterioration for remainder of construction period.

END OF SECTION

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SECTION 09250 - GYPSUM BOARD ASSEMBLIES

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 SCOPE

- A. Provide gypsum wallboard work, complete, including non-load bearing metal studs and gypsum board partitions, furred walls, furred ceilings, and metal trim and accessories.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Taping and finishing of gypsum wall board joints; Section 09900.
- B. Metal Flashings; Section 07600.
- C. Commercial Building Wrap; Section 07274
- D. Lightgauge Metal framing; Section 05400
- E. Insulation; Section 07210

1.4 SUBMITTALS

- A. Comply with Section 01300.
- B. Product Data: Submit manufacturer's installation instructions for each gypsum wallboard component.
- C. Shop Drawings: Submit drawings showing typical and special partition and ceiling assemblies. Include materials, material gages, stud spacing, and bracing of studs.

1.5 QUALITY ASSURANCE

- A. Allowable tolerances; 1/8" offsets between planes of board faces, and 1/4" in 8 ft. for plumb, level, warp, and bow.
- B. Fire-Resistance Rating: Where work is indicated for fire-resistance ratings, provide materials and installations identical with assemblies which have been tested and listed by recognized authorities, including U.L., O.S.U., and U.S.G.

1.6 DELIVERY, STORAGE AND PRODUCT HANDLING

- A. Deliver materials in original packages, containers and bundles, fully identified with manufacturer's name, brand, type and grade. Store in dry, well ventilated space, protected from the weather under cover and off the ground. Stack flat to prevent sagging. Handle to prevent damage to edges, ends and surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. U.S. Gypsum System is specified; equivalent systems of Gold Bond and Georgia Pacific are acceptable.

2.2 MATERIALS

- A. Studs, Channels And Runners: Roll-formed, 20 gage except where otherwise indicated, electro-galvanized steel. 7/8" furring channels. Stud sizes 6", 3-5/8" and 2-1/2", as indicated. Punch holes near each end of the stud to facilitate installation of horizontal electrical wiring or conduit; punch as required for piping.
- B. Hangers: 8 gage galvanized soft annealed wire.
- C. Tie Wire: 18 gage galvanized soft annealed wire.
- D. Interior gypsumboard: Sheetrock Firecode (Type X), 5/8" thick with tapered edges.
- E. Trim Accessories: Provide manufacturer's standard trim accessories of types indicated for drywall work, formed of galvanized steel unless otherwise indicated, with either knurled and perforated or expanded flanges for nailing or stapling, and beaded for concealment of flanges in joint compound. Provide all corner beads, edge trim-beads, and control joint beads, types as indicated, and as required by project conditions.
- F. Fasteners:
 - 1. Self-drilling, self-tapping screws for power driving with special head design for gypsumboard attachment (Type S), producing surface depression for proper concealment; 1" long for single layer and 1-5/8" long for double layer.
 - 2. Provide other fasteners as required by project conditions and as recommended by manufacturer.
- G. Acoustical Sealant: U.S.G. Acoustical Sealant, or approved equal.
- H. Laminating Adhesive: Type recommended by gypsum wallboard manufacturer.
- I. Sound Attenuation Batts: Schuller's, "Sound-SHIELD" sound control batts, complying with performance requirements of ASTM 665, Type 1. 4" thick batts for 35/8" stud walls, and 63/4" batts for 6" stud walls. As manufactured by Schuller International, Inc. Denver, Colorado. Knauf, "Quietherm" is acceptable.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with ASTM C 840, manufacturer's instructions, as specified and as indicated on the drawings.
- B. Partitions: Provide partition assemblies as indicated; space studs 16" o.c., unless otherwise indicated.
 - 1. Provide floor and ceiling runner designed to hold and align studs. Provide additional studs at door frames.
- C. Furred Walls/Areas: 5/8" thick gypsum board, as indicated, on studs and furring channels, as indicated.
- D. Suspended Ceiling: 5/8" thick gypsum board on furring channels at 24" o.c., attached to carrying channels at 4' o.c. suspended by hanger wire from the structural bracing at 4' o.c.
 - 1. Note: Drywall suspension system may be used; direct hung heavy-duty single-web steel main tees with furring channels and cross tees at light fixtures; similar to U.S.G. (Donn) Rigid X or Chicago Metallic 640 Furring.

- E. Application: Except where specified otherwise:
1. Apply gypsum board parallel to studs with single panels in longest length available.
 2. Provide casing beads where edges of gypsum board meet dissimilar materials.
 3. Grout hollow metal frames solid with portland cement grout in framed wall construction. Provide double studs at door frames.
 4. Fasten gypsum board with specified screws.
 - a. Space screws 16" o.c. for walls and 12" o.c. for single layer. Space screws 24" o.c. for walls and 16" o.c. for base layer of double layer (both layers mechanically attached) and 16" o.c. for walls and 12" o.c. for ceilings of face layer.
 5. Cooperate with the other trade contractors in placing of backing and blocking required as backing for all millwork, fixtures, fittings, and accessories. Reinforce and brace studs in partitions supporting fixtures, to provide firm backing and prevent deflection of the wall.
 6. Brace studs in compliance with manufacturer's recommendations for wall height, stud spacing, and other project conditions indicated. Include bracing in shop drawing submittal.
 7. Arrange gypsum board joints on opposite sides of partitions to occur on different studs.
 9. Treat all internal angles formed by the intersection of either wall board surfaces with metal trim and/or a taped joint system as indicated or required.
 10. Treat all vertical and horizontal external corners with metal bead corner reinforcement applied in accordance with manufacturer's instructions.

END OF SECTION

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SECTION 09510 - ACOUSTICAL CEILING SYSTEMS

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 SCOPE

- A. Provide acoustical ceiling, and mylar coated ceiling complete, including elements of the suspension system, trim, and facilities for the support and attachment of lighting fixtures, air diffusers, grilles and registers. See Finish Schedule and Reflected Ceiling Plans for location.

1.3 SUBMITTALS

- A. Comply with requirements of Section 01300.
- B. Shop Drawings: Submit shop drawings, for review by Architect, indicating location of ceiling units and items of work which are to be coordinated with the ceiling, and framing and support details for all work supported by the suspension system.
- C. Samples: Submit sample of ceiling panel material, grid and wall molding proposed for use for acceptance by Architect.
- D. Compatibility statement of adhesive and concrete curing materials.
- E. Moisture test prior to tile application.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original unopened packages, fully identified with type, finish, performance data and compliance labels. Handle and store in accordance with manufacturer's instructions and recommendations.

1.5 JOB CONDITIONS

- A. Do not install interior acoustical units until space has been enclosed and is weathertight, wet work has been completed and is dry, until work above ceiling is complete, and until temperature and humidity conditions will be continuously maintained at values near those indicated for final occupancy.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Armstrong is the basis of design for ceilings LA-1, and LA-2. Any substitutions must be submitted as per Section 01300 and within 60 days of the start of construction as indicated by the date of the Notice to Proceed. The Architect shall be the judge of the equivalency and acceptability of substitution requests.

2.2 ACOUSTICAL LAY-IN CEILING, LA-1

A. Lay-In Panel:

1.Characteristics:

- a. Material: Wet formed mineral fiber with DuraBrite acoustically transparent membrane.
- b. Surface Finish: DuraBrite with factory applied latex paint.
- c. Color: White.
- d. Light Reflectance: LR 0.90.
- e. Size: 24" X 24" X 3/4".
- f. Edge Detail: Beveled 15/16" tegular lay-in.
- g. NRC: 0.70.
- h. CSTC: Minimum 35.
- i. Surface Burning Characteristics: Class A (Flame Spread 25 or under), UL labeled.
- j. Insulation Value: Average R factor (at 75F), 2.2.
- k. RH90 Performance: No visible sag under conditions not to exceed 90%.
- l. Warranty: 30 year limited system warranty against visible sag
- m. Pattern: Armstrong Ultima RH90, 1911.

2.3 CONCESSION LAY-IN CEILING LA-2

A. Lay-in Panel:

1. Characteristics:

- a. Material; Wet-formed mineral fiber.
- b. Surface Finish; Washable, Mylar-faced membrane, #1715M.
- c. Color; White (WH).
- d. Light Reflectance; 0.79 as per ASTM E 1477
- e. Size; 24" X 48" X 3/4"
- f. Edge Detail; Square lay-in.
- g. NRC; 0.55 per ASTM C 423
- h. CAC; Minimum 35 per ASTM E 1414
- i. Surface Burning Characteristics; Class A (Flame 25 or less, Smoke 0).
- j. Insulation Value; Average R factor ; 1.5
- k. Warranty; 30 years limited lifetime.
- l. Pattern; Armstrong Clean Room Mylar, #1715.

2.4 SUSPENSION SYSTEM MATERIALS

- A. General: Provide suspension system materials conforming to ASTM C 635.
- B. Attachment Devices: Type recommended by suspension system manufacturer for attachment or anchorage of ceiling hangers to structure above ceiling, sized for not less than 5 times the hanger design load for the structural classification indicated.
- C. Hanger Wire: Minimum No. 12 gage, galvanized annealed steel wire.

D. Exposed Grid System:

1. For Armstrong, Ultima RH90, 1911, Ceiling LA;
Armstrong 15/16" Prelude Exposed Tee;
 - a. Material: Double-web electrogalvanized steel.
 - b. Face Dimension: 15/16".
 - c. Profile: Expose tee.
 - d. Surface Finish: Baked Polyester paint.
 - e. Color: White.
 - f. Structural Classification: Intermediate Duty.
2. For Armstrong, Clean Room Mylar, Ceiling LA-1;
Armstrong 15/16" Prelude ML, #7300, Exposed Tee;
 - a. Material: Hot dipped galvanized steel.
 - b. Face Dimension: 15/16" width, 1-1/2" height.
 - c. Profile: Exposed tee.
 - d. Surface Finish: Painted steel.
 - e. Color: White (WH).
 - f. Structural Classification: ASTM Duty Class; Intermediate Duty.

PART 3 - EXECUTION

3.1 INSTALLATION AND WORKMANSHIP

- A. Install mechanical suspension system and acoustical units in strict accordance with ASTM C 636 and manufacturer's directions, using experienced acoustical mechanics.
- B. Install in the patterns indicated on the drawings in such a manner to permit border units of the greatest possible size, unless otherwise indicated.
- C. Refer to drawings for quantities and locations of lighting fixtures, air supply and return diffusers, grilles and registers, and fire sprinkler heads, which will be installed in the ceilings, and which will replace and/or pierce the acoustical unit.
- D. Exposed Grid:
 2. Install acoustical ceiling suspension system level and true to line, with neat and close-fitting joints between spliced and intersecting members. Grid to be square, and ends and cross tees tightly butted, and all faces in the same plane. Do not rest flanges of the cross tees on the flanges of the main runners.
 3. Neatly and accurately cut and place acoustical panels to fit snugly into the main and cross tees, with no space between the bottom of the acoustical panels and grid system, and without gaps and edges (except at tegular edges) showing in the finished installation.

3.2 CLEANING

- A. Clean soiled or discolored acoustical units, trim, moldings, and suspension members after installation. Touch up scratches, abrasions, voids, and other defects in painted surfaces. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09510

SECTION 09678 - RESILIENT WALL BASE

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 SCOPE

- A. Provide resilient wall base and accessories, complete. See Finish Schedule for locations and extent of floor accessories as well as the Master Colors and Materials Schedule on the Finish Plan AF-1.

1.3 SUBMITTALS

- A. Product Data: Submit copy of manufacturer's technical data, installation instructions, and maintenance instructions for each accessory.
- B. Samples: Submit full color range samples for type and pattern of each accessory specified for selection by Architect.

1.4 DELIVERY AND STORAGE

- A. Delivery: Deliver materials to the project site in the manufacturer's original unopened containers, clearly marked to indicate pattern gage, lot number and sequence of manufacture.
- B. Storage: Store in original container at not less than 70 F for at least 48 hours before start of installation.

1.5 JOB CONDITIONS

- A. Maintain minimum temperature of 70 F for minimum of 48 hours prior to installation. Maintain 70 temperature continuously during and after installation as recommended by the flooring manufacturer, but in any case not less than 48 hours.

PART 2 - PRODUCTS

2.1 RUBBER BASE

- A. Johnsonite is specified, Roppe, Flexco, Burke, are acceptable, 6" topset cove, with preformed or molded interior and exterior corners; colors as selected by Architect from full color selection except premium colors.
- B. Refer to the Master Colors and Materials Schedule on Finish Plans for specific color selections.

2.3 OTHER MATERIALS

- A. Provide adhesives, primers, crack fillers and other materials required but not specifically described, as recommended by the resilient flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the areas and conditions under which resilient accessory work is to be placed. Moisture content of concrete slabs, building air temperature and relative humidity must be within limits recommended by flooring manufacturer. Do not proceed until unsatisfactory conditions have been corrected.
- B. Use trowleable leveling and patching compounds epr manufacturer's directions to fill cracks, holes, and depressions.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil or silicone.
- D. Broom clean or vacuum substrates to be covered immediately before installing products specified. Following cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust.

3.2 INSTALLATION

- A. Install products using methods indicated according to manufacturer's installation directions.
- B. Resilient Base: Apply resilient base to walls, columns, pilasters, casework, and other permanent fixtures in rooms or areas where base is indicated. Install base in as long lengths as practicable. Tightly bond base to backing throughout the length of each piece, with continuous contact at horizontal and vertical surfaces. Do not stretch resilient base during installation.
 - 1. Preformed Corners: Install inside and exterior corners before installing straight pieces.
 - 2. Formed corners:
 - a. Form inside corners from straight pieces of maximum lengths possible by cutting an inverted V-shaped notch in toe of rubber base at the point where corner is formed. Shave back of base where necessary to produce snug fit to substrate.
 - b. Form outside corners from straight pieces of maximum lengths possible by shaving back of base at point where bending will occur. Remove a strip perpendicular to length of base only deep enough to produce a snug fit without bends whitening or removal of more than half the thickness of rubber base.

END OF SECTION

SECTION 09800 - ACRYLIC TEXTURED COATING

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:** Exterior acrylic textured coating to be applied to 8'-0" tall, 8" thick concrete enclosure wall at the rear mechanical court, and any other locations noted on the plans.

1.3 SUBMITTALS:

- A. Product Data: Submit manufacturers' product data and application instructions on coating system.
- B. Prior to application, submit sample panel showing specified texture and specified color, for Architect's approval.

- 1.4 JOB CONDITIONS:** Do not apply coating when temperatures are 40°F or due to fall below 40°F within 24 hours, or to frozen or frost-filled surfaces. Do not apply if rain is expected within 24 hours.

PART 2 – PRODUCTS:

2.1 MANUFACTURERS

- A. BASF, THOROCOAT is the basis of design. Any substitutions must be submitted as per Section 01300 and within 60 days of the start of construction as indicated by the date of the Notice to Proceed. The Architect shall be the judge of the equivalency and acceptability of any substitutions.

2.2 MATERIALS

- A. BASF, THOROCOAT HEAVY TEX, water based acrylic heavily textured coating for concrete. Color to be selected by the Architect.
- B. Prime Coat: Prime all concrete surfaces with 1 coat of THORO CM Primer at a rate of 175-275 ft./gal. Before application of THOROCOAT HEAVY TEX.
- C. Finish Coat: "THOROCOAT HEAVY TEX, with a hopper-gun sprayer capable of spraying heavily-bodied and heavily aggregated materials. Touch up with a brush if needed.
- D. Crack Fillers:
 - 1. Hairline Cracks (no larger than 1/32"): "Thorolastic-Smooth".

2. Large Static Cracks (larger than 1/32" up to 1/16" and non moving): "Thorolastic Knife Grade", water based acrylic emulsion in a putty consistency.
3. Dynamic Cracks (subject to thermal or other movement): Sealant Joint as specified in Section 07900.

PART 3 – EXECUTION:

3.1 PREPARATION:

- A. Clean surfaces free of all laitance, dirt, dust, grease, from oil, fungus, or other contaminant preventing good adhesion. Pre-treat hairline and larger cracks with material as recommended by manufacturer.
- B. Clean hairline and dynamic cracks and pre-treat with specified materials in compliance with manufacturer's directions.

3.2 APPLICATION:

Comply with manufacturer's instructions and recommendations.

- A. Apply base coat. Allow to dry prior to starting finish coat.
- B. Spray apply finish coat in a heavy, unstretched, uniform manner in one direction.
- C. Total dry film thickness for 2 coat system, 16-18 mils.
- D. Allow 24 hours drying time at 70°F and 50°RH.

END OF SECTION

SECTION 09900 - PAINTING

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 SCOPE

- A. Provide painting and finishing of interior and exterior items and surfaces throughout the project, except as otherwise indicated. Provide field painting of hangers, exposed steel and iron work, of primed metal surfaces and exposed-to-view prefinished metal surfaces of items, as required to match adjacent surfaces, and equipment installed under mechanical and electrical work. Refer to those respective sections for painting requirements. Provide touch-up of pre-finished items as required to match original finish.
- B. Do not paint brick, water repellent coating, acoustical ceiling, anodized aluminum, surfaces indicated not to receive paint, and pre-finished items except as noted above.

1.3 SUBMITTALS

- A. Comply with Section 01300.
- B. Paint Schedule: Submit paint schedule listing each material cross-referenced to the specific paint and finish system and application. Identify by manufacturer's catalog number and general classification.
- C. **Samples: Painting subcontractor shall submit two 12"x12" sample boards for each paint color called for in the Color and Materials Schedule. Samples shall be 12"x12" pieces of 5/8" gyp. bd. with tape around edges. Each sample shall be a finished product consisting of primer and two coats of the finished paint for that color. The color name and number as well as manuf. is to be written on the back of each sample legibly with black felt tip pen. Samples shall be delivered to the Architect's office at least two weeks prior to the beginning of any painting, and prior to the purchasing of bulk quantities of paint by the subcontractor.**

1.4 DELIVERY AND STORAGE

- A. Deliver materials to the job site in original, new and unopened packages and containers bearing manufacturer's name and label.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Provide all paints, enamels, stains, varnishes, and admixtures of first line quality. Sherwin Williams is the basis of design. Benjamin Moore, PPG Industries, Inc., and Glidden are acceptable. Any substitutions must be submitted as per Section 01300 and within 60 days of the start of construction as indicated by the date of the Notice to Proceed. The Architect shall be the judge of the equivalency and accepta-

bility of any substitution.

2.2 MATERIALS

- A. See paragraph 3.50, SCHEDULE OF PAINT TREATMENT for materials. All finish coats shall contain mildewcides. Grind in the factory all exterior colors. Shop mixing is not permitted.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the areas and conditions under which painting work is to be performed. Do not proceed with the work until unsatisfactory conditions have been corrected. Starting of painting work will be construed as acceptance of the surfaces within any particular areas.

3.2 SURFACE PREPARATION

- A. Perform all preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified. Remove all hardware, plates, lighting fixtures, and similar items in place and not to be finish painted, or provide protection prior to surface preparation and painting operations. Remove, if necessary, for the complete painting of the items and adjacent surfaces. Reinstall the removed items by workmen skilled in the trades involved, after painting is completed.
- B. Gypsum Wall Board: Treat all joints, nail heads and other depressions in the surface of the wallboard, in accordance with the recommended manner, with a taped joint system by the gypsum wallboard manufacturer. Do not paint over gypsum wallboard work until taped joints are thoroughly dry.
- C. Wood: Clean wood surfaces to be painted of all dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those surfaces exposed to view, and dust off. Prime, stain, or seal wood required to be job painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood. Scrape and clean small, dry seasoned knots, and apply thin coat of white shellac or other recommended knot sealer, before application of the priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried.
- D. Ferrous Metals: Touch-up shop-applied prime coats which have damaged or bare areas. Wire-brush, solvent clean, and touch up with the same primer as the shop coat.
- E. Galvanized Surfaces: Clean free of oil and surface contaminants with an acceptable non-petroleum based solvent.

3.3 APPLICATION

- A. Apply paint by brush, roller, spray, or other acceptable practice in accordance with the manufacturer's directions. Use brushes best suited for the type of material being applied. Use rollers of carpet, velvet back, or high pile sheeps wool as recommended by the manufacturer for material and texture required.
- B. The number of coats and paint film thickness required is the same regardless of the

application method. Do not apply succeeding coats until the previous coat has completely dried. Sand between each enamel coat application with fine sand paper, or rub surfaces with pumice stone where required to produce an even smooth surface in accordance with the coating manufacturer's directions.

- C. Apply additional coats when undercoats, stains, or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance.
- D. Give special attention to insure that all surfaces, including edges corners, crevices, welds, and exposed fasteners receive a film thickness equivalent of that of flat surfaces.

3.4 CLEAN-UP

- A. Thoroughly clean all spots, smears, spills, etc., remove from the site all discarded paint materials, rubbish cans and rags at the end of each work day.

3.5 SCHEDULE OF PAINT TREATMENTS

Treatment

No.	Location	Coats	Materials
1.	Exterior ferrous metal structural steel rafters, beams and columns at open area farmers market. Refer also to Section 05120 Structural Steel, and also, the Color and Materials Schedule on The Finish Plans.		<ul style="list-style-type: none">• Shop Prime: TNEMEC Perimeprime, Series 394 to 3.5 mils.• Intermediate Coat: TNEMEC Hi-Build Epoxoline, Series 66 at 2.0 to 5.0 mils.• Finish Coat: TNEMEC, Endura-Shield, Series 1094, at 2.0 to 5.0 mils.
2.	Exterior and Interior Galvanized metal.		<ul style="list-style-type: none">* Prime Coat: Galvanized iron primer.* Intermediate coat: Exterior semi-gloss alkyd enamel..* Finish Coat: Exterior semi-gloss alkyd enamel. enamel.
3.	Interior Gypsum Board;		<ul style="list-style-type: none">* Prime Coat: Latex wall primer.* Intermediate Coat: Semi-gloss acrylic latex enamel.* Finish Coat: Semi-glass acrylic latex enamel.
4.	Interior Wood and Cabinets:		<ul style="list-style-type: none">* Prime Coat: Alkyd wood primer.* Intermediate Coat: Semi-gloss alkyd enamel.* Finish Coat: Semi-gloss alkyd enamel.
5.	All interior concrete block above ceramic tile in Women's 102, and Men's 103.		<ul style="list-style-type: none">* Prime Coat: Concrete block filler; Sherwin Williams, Heavey Duty block filler, B42W46.* Intermediate Coat: Sherwin Williams, Pro Industrial, Hi-Bild Waterbased Catalyzed Epoxy.

Farmers Market
Paragould, Arkansas

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* Finish Coat: Sherwin Williams, Pro Industrial, Hi-Bild Waterbased Catalyzed Epoxy.

END OF SECTION

SECTION 10165 - PLASTIC LAMINATE TOILET PARTITIONS

PART 1 - GENERAL

1.1 SCOPE

- A. Provide plastic laminate toilet partitions, complete.

1.2 SUBMITTALS

- A. Comply with Section 01300.
- B. Product Data: Submit manufacturer's detailed technical data for materials, fabrication, and installation.
- C. Shop Drawings: Submit shop drawings for the fabrication and erection of toilet partition assemblies not fully described by manufacturer's data. Show all anchorages, gages of laminated plastic, hardware, fittings and fastenings. Submit setting drawings, templates and instructions for the installation of anchorage devices built into other work.
- D. Samples: Submit full color range of plastic laminate samples for selection by Architect.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Bobrick Washroom Equipment, Global Steel Products, or Columbia Partitions, or approved equal.
- B. Bobrick, Classic Series 1540, overhead braced (#1542) w/ high pressure plastic laminate finish, 4516 density impregnated particle board stiles, panels & doors.

2.2 TYPE:

- A. Flush construction, floor mounted overhead braced type partitions. Width, length, and height as indicated on the Drawings.

2.3 MATERIALS AND FABRICATION

- A. Laminated Plastic: NEMA Std. LDS-1985, minimum .050" thick in pattern and color as called out on the drawings in the Color and Materials Schedule.
- B. Door, Panel, Pilaster Core, Screens: High density particleboard or close-grained hardwood-faced plywood. Finished pilasters 1 - 1/4" thick (1 - 1/8" core); finished doors, partition and screen panels 1" thick (7/8" core).
- C. Sealer: Seal core surfaces exposed by machining for hardware attachment with sealer as recommended by the manufacturer.
- D. Adhesive: Urea resin glue for permanent water resistant heat resistant bonding.
- E. Pilaster Shoes: 3" high, 20 gauge type 302/304 polished stainless steel.
- F. Stirrup Brackets: Manufacturer's standard design for attaching panels to walls and pilasters of stainless steel or chrome-plated brass to match hardware finish.
- G. Hardware and Accessories: Polished stainless steel or chrome-plated brass hardware and accessories, including cutout insert type (not surface mounted) gravity or spring action cam type hinges, latch/keeper, and coat hook.

- H. Headrails: Continuous full length headrails, minimum 1" x 1 - 1/2", of stainless steel, extruded anodized aluminum, or anodized aluminum tubing, set into the top of the pilaster in a reinforced channel.
- I. Anchorages and Fasteners: Exposed fasteners of stainless steel, chromium plated steel or brass finished match hardware. Use theft resistant (oneway) type heads and nuts for exposed screws. Use hot-dip galvanized, cadmium plated, or other rust resistant protective-coated steel for concealed anchors.

2.4 FABRICATION

- A. Furnish standard doors, panels, screens, and pilasters fabricated for floor mounted and overhead braced partition system. Furnish units with cutouts, drilled holes, and internal reinforcement to receive partition-mounted hardware, accessories, and grab bars, as specified.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install partitions and screens rigid, straight, plumb and level, in strict accordance with manufacturer's instructions and final shop drawings.
- B. Provide uniform clearance of not more than 1/2" between pilasters and walls, and not more than 1" between panels and walls.
- C. Secure panels to wall with not less than 2 stirrup brackets attached near top and bottom of panel. Locate wall brackets so that holes for wall anchorages occur in tile joints. Secure panels to pilasters with not less than 2 stirrup brackets located to align with stirrup brackets at wall.
- D. Secure panels in position with manufacturer's recommended anchoring devices.
- E. Secure pilasters to floor and level, plumb and tighten installation with devices furnished. Secure overhead-brace to each pilaster with not less than two fasteners. Hang doors and adjust so that tops of doors are parallel with overhead-brace when doors are in closed position.
- F. Attach screens with full length and continuous stainless steel, anodized aluminum or chrome plated brass channel supports, as recommended by manufacturer to suit supporting structure. Set units to provide support and to resist lateral impact.

3.2 ADJUST AND CLEAN

- A. Adjust and lubricate hardware for proper operation. Set hinges on inswinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges outswinging doors to return to fully closed position.
- B. Clean exposed surfaces of partition systems using materials and methods recommended by manufacturer, and provide protection as necessary to prevent damage during remainder of construction period.

END OF SECTION 10165

SECTION 10800 - TOILET ACCESSORIES

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 SCOPE

- A. Provide toilet accessories, complete.

1.3 SUBMITTALS

- A. Comply with Section 01300.
- B. Product Data: Submit technical data and installation instructions for each toilet accessory.
- C. Shop Drawings: Submit shop drawings showing grab bar installation. Provide setting drawings, instructions and directions for installation of anchorage devices in other work.

1.4 JOB CONDITIONS

- A. Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of accessory units.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Bobrick, Classic Series is the basis of design. Bradley or ASI is acceptable. Any substitutions must be submitted as per Section 01300 and within 60 days of the start of construction as indicated by the date of the Notice to Proceed. The Architect shall be the judge of the equivalency and acceptability of any substitutions.

2.2 MATERIALS

- A. Stainless Steel: ANSI Type 302/304, No. 4 finish, 22 gage minimum.
- B. Fasteners: Screws, bolts, and other devices of same material as accessory unit, or of galvanized steel where concealed.

2.3 ACCESSORIES

Identification tags above each item correspond with the identification tags indicated on drawings for that particular item. See Sheet A4.01

TA01: Toilet Tissue Dispenser, Single Jumbo Roll, surface mounted: Satin finish Type 304 stainless steel. Unit, 10-5/8"W x 10-5/8"H x 4-1/2"D. Bobrick, B-2890.

TA02, TA03, & TA04: Grab Bars, 3'-6, 3'-0, & 1'-6. Bobrick B-6806 Series, shapes and sizes indicated. Strongly secure fastenings to steel backing plate or by other accepted methods to withstand contemplated stress.

Submit shop drawings of anchoring methods. Bars to have satin finish w/ peened

gripping surface.

- TA-05 Surface Mounted Hand Dryer: Bobrick, B-7128, Stainless steel cover, surface mounted ADA dryer.
- TA-06 Surface Mounted Seat Cover Dispenser: Bobrick, Classic Series, B-221. Satin finish stainless steel. Dispenses 250 single or half fold toilet seat covers. 15-3/4" W x 11" H x 2" D.
- TA-07 Surface Mounted Paper Towel Dispenser; Bobrick, Classic Series, B-2620, Satin Finish stainless steel. Dispenses 400 C-fold or 525 multifold towels. 10-3/4" W x 14"H x 4" D.
- TA-08 Partition Mounted Sanitary Napkin Disposal. Bobrick, Classic Series, B-354, Satin Finish, stainless steel, Mounts in partitions 1/2" to 1-1/4" thick. With removable leak-proof 1.2-gal plastic receptacle.
- TA-09 Surface Mounted Sanitary Napkin Disposal. Bobrick, B-270, Satin Finish, stainless steel. 7-1/2" W x 10"H x 3-13/16" D.
- TA-10: Soap Dispenser, counter mounted, **6" spout**: Bobrick B-8226, Manual Liquid Soap Dispenser. **Mount as close to the lavatory as possible.**
- TA-11 Fixed Position Tilt Mirror. Bobrick, B-293 Series, Type 304 satin finish stainless steel. #1836, 18"W x 36"H.
- TA-12 Horizontal, Wall Mounted Baby Changing Station. Bobrick, KB200-00, Cream Color cabinet and bed. Unit 35-3/16" W x 22-1/4" H x 4" D.
- TA-13 Robe Hook. Bobrick, B-7671 satin finish stainless steel robe hook w/ concealed mounting bracket.
- TA-14: Mop and Broom Holder (At janitor sink): Bobrick B-224, 18 gauge, Type 304 satin finish stainless steel, 36" L x 6"H x 8"D. Position directly above mop sink.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install toilet accessory units in accordance with manufacturer's instructions, using fasteners which are appropriate to substrate and recommended by manufacture of unit.
- B. At grab bars strongly secure fastenings to steel backing plate or by other accepted methods. Submit shop drawings of anchoring methods.
- C. Install units plumb and level, firmly anchored in location and at heights indicated or directed by Architect. Comply with all ADA regulations for grab bars and accessory installations.

END OF SECTION

SECTION 10990 - MISCELLANEOUS SPECIALTIES

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 SCOPE

- A. Provide miscellaneous specialties, complete.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. None

1.4 SUBMITTALS

- A. Comply with Section 01300.
- B. Product Data: Submit manufacturer's technical data and installation instructions for accessory item specified.
- C. Shop Drawings: Submit shop drawings indicating location, details of installation, finishes, and other pertinent data.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. The manufacturer listed for each of the following products is the basis of design. Other manufacturers may be equivalent and acceptable. Any substitutions must be submitted as per Section 01300 and within 60 days of the start of construction as indicated by the date of the Notice to Proceed.

2.2 FIRE EXTINGUISHERS, & BRACKETS

- A. Larsen's Manufacturing Company is specified. Equivalent product of J. L. Industries and Potter Roemer are acceptable.
- B. Extinguisher: MP10 4A-60B:C multi-purpose, 10 lb. heavy duty steel extinguisher.
- C. Wall mounted extinguisher: provide Standard Bracket No. 817 at all locations showing a wall mounted fire extinguisher on the plans.

2.3 ROOF HATCH

- A. Manufacturers: Bilco is specified; equivalent hatch from Precision Stair, Babcock-Davis, Milcor, and Dur-Red are acceptable, or approved equal.
- B. Model: Type E, 3'x 3' with ladder access.
 - a. Model E-40, steel curb and aluminum cover.
 - b. Cover: Breakformed, hollow-metal design with 1" concealed fiberglass insulation, 3' beaded overlapping flange, fully welded at corners, and internally reinforced for 40psf live load.
 - c. Curb: 12" in height with integral cap flashing, 1" fiberboard insulation, fully welded

at corners and 3-1/2" mounting flange with 7/16" holes provided for securing frame to the roof deck.

- d. Gasket: Extruded EPDM rubber gasket permanently adhered to cover.
- e. Hinges: Heavy duty pintle hinges with 3/8" Type 316 stainless steel hinge pins.
- f. Latch: Slam latch with interior and exterior turn handles and padlock hasps.
- g. Lift Assistance: Compression spring operators enclosed in telescopic tubes. Automatic hold open arm with grip handle release.
- h. Finish: Mill finish aluminum.
- i. Hardware: Aluminum; engineered composite compression spring tubes. Steel compression springs with electro-coated acrylic finish. All other hardware is zinc plated/chromate sealed.

2.4 VERTICAL LADDERS TO ROOF HATCHES

- A. A-MEZZ Industrial Structures, Ladder Hatch. Com: fixed steel vertical ladder. Series FS, Model No. F17S-C5, 7SOB 18 rung steel ladder. 7" standoff brackets, 16" rung length, 3/4" round steel rungs, 2" x 2'-1/2" angle side members, 12" rung spacing. 300lb. capacity. Ladder to have powder coated finish; color Designer Beige.
- B. A-MEZZ Industrial Structures, Ladder Hatch. Com: fixed steel vertical ladder. Series FS, Model No. F17S-C5-NT, 21SOB, 18 rung steel ladder. 21" standoff brackets, 16" rung length, 3/4" round steel rungs, 2" x 2'-1/2" angle side members, 12" rung spacing. 300lb. capacity. Ladder to have powder coated finish; color Designer Beige.

Contact AMEZZ Industrial Systems, Inc. 7754 Herrick Park St., Cleveland, Ohio. 44236, (888)- 432-2657. Refer to Architectural Cross Sections and Details.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install each accessory in compliance with manufacturer's instruction and final shop drawings.
- B. Install at locations and mounting heights indicated or as directed by Architect.

END OF SECTION

SECTION 11400 - EQUIPMENT

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 SCOPE

- A. Provide the following equipment complete.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Refer to Architectural Plans, Plumbing Plans and Electrical Plans.

1.4 SUBMITTALS

- A. Comply with Section 01300.
- B. Product Data: Submit manufacturer's technical data and installation instructions for accessory item specified.
- C. Shop Drawings: Submit shop drawings indicating location, details of installation, finishes, and other pertinent data.

PART 2 - PRODUCTS

2.1 ICE MACHINE W/BIN & FILTER ASSEMBLY:

- A. Ice-O-Matic, Head Model #CIM0530A, Bin Model #B55, is the basis of design. Equivalent products of other manufacturers may be acceptable. Any substitutions must be submitted as per Section 01300 and within 60 days of the start of construction as indicated by the date of the Notice to Proceed. The Architect shall be the judge of the equivalency and acceptability of any substitutions.
 - 1. Standard features and accessories.
 - 2. Furnish and set in place as per the Manufacturer's recommended standardized Specifications and/or as follows;
 - 3. Air cooled.
 - 4. **Agion** anti-microbial compound registered components.
 - 5. Stainless steel Type 304 construction, interior/exterior.
 - 6. Electro-mechanical controls.
 - 7. Production capacity per 24 hours; @ 70 degree air/50 degree water 958 lbs. (435kg); @ 90 degree air/70 degree water 698 lbs. (317kg); water usage per 100 lbs. of ice, 90 degree air/70 degree water, 21.8 gallons (83 liters).
 - 8. Electrical; KW's used per 100 lbs. of ice, 90 degree air/70 degree water, 6.2, BTUH 15003, 3 wire, 208-230/60/1 phase, 13.0 amps, maximum fuse size

- 20 amps.
9. Refrigerant: R-404-A
 10. Five (5) year compressor warranty.
 11. **Extended warranty program.**
 12. Registration card with serial numbers must be sent to the factory 10 days Post installation.
 13. **Warranties:** Ice machine and it's components i. e. shall be guaranteed as follows: Parts: Two (2) years on all components, three (3) years on all cube icemaker components (refer to the extended warranty program when applicable). After an inspection authorized by the manufacturer, should any part of the product Prove to be defective in material or workmanship, it shall be replaced or repaired Free of charge, F.O.B. factory. This warranty will not apply to accessories or Components supplied but manufactured by other companies who furnish their Own warranties. There shall be no other warranties expressed or implied.
 14. **Repairs & service:** Provide repair and /or service on refrigeration equipment Supplied within 24 hours, seven day service after receipt of the trouble call during the first year labor warranty period. Provide phone number and address of the Manufacturer's "service or repair department", this shall be provided in the "Owner's Operation Manual".

General Requirements:

1. All installers shall hold a current Class A Certified Air Conditioning and Refrigeration Contractors License, registered with the "Arkansas Department of Health", Slot – 29 – HVACR Section.
Installers/Contractors shall have a minimum five (5) years in refrigeration as their Business, and shall provide installation reference documentation to the Architect/ Consultant upon request.
2. The Manufacturer shall comply with applicable National Sanitation Foundation (NSF) standards and recommended criteria.
3. Health Code: Installation shall be in accordance with Local Health Department Regulations that are applicable to this project.
4. National Electrical Code: Construction and installation shall be in accordance and meet or exceed all applicable Code Requirements.
5. Standard Plumbing Code: Construction and installation shall be in accordance with And meet or exceed all applicable Code Requirements.
6. All copper tubing to be refrigerant Grade A.C.R. or Type "L".
7. All electrical wiring and installation shall be in accordance with the wiring diagram As supplied by the Manufacturer. **Final connection by Electrical Contractor (Division 16 Contractor).**
8. **Plumbing Contractor (Division 15 Contractor)** to provide individual condensate drain line along with the additional "purge" drain line for the evaporator. Drain lines shall be run in a neat and orderly fashion. All exposed piping shall be painted

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two (2) coats of Chrome Aluminum by the Plumbing Contractor.

END OF SECTION 11400

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SECTION 220548

VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 DEFINITIONS

- A. Plumbing Component: Where referenced in this section in regards to seismic controls, applies to any portion of the plumbing system subject to seismic evaluation in accordance with applicable codes, including distributed systems (e.g., piping).
- B. Seismic Restraint: Structural members or assemblies of members or manufactured elements specifically designed and applied for transmitting seismic forces between components and the seismic force-resisting system of the structure.

1.02 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- B. FEMA 412 - Installing Seismic Restraints for Mechanical Equipment 2002.
- C. FEMA 413 - Installing Seismic Restraints for Electrical Equipment 2004.
- D. FEMA 414 - Installing Seismic Restraints for Duct and Pipe 2004.
- E. FEMA E-74 - Reducing the Risks of Nonstructural Earthquake Damage 2012.
- F. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems 2008.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.
 - 1. Seismic Controls: Include seismic load capacities.

PART 2 PRODUCTS

2.01 SEISMIC CONTROL REQUIREMENTS

- A. Design and provide plumbing component restraints, supports, and attachments suitable for seismic loads determined in accordance with applicable codes, as well as gravity and operating loads and other structural design considerations of the installed location. Consider wind loads for outdoor plumbing components.
- B. Seismic Design Criteria: ICC (IBC).
 - 1. Seismic Design Category: D.
- C. Seismic Restraints:
 - 1. Provide seismic restraints for plumbing components except where exempt according to applicable codes and specified seismic design criteria, as approved by authorities having jurisdiction.
 - 2. Seismic Restraint Exemptions:
 - a. Exemptions for Seismic Design Category D, E, and F:
 - 1) Discrete plumbing components that are positively attached to the structure where either of the following apply:
 - (a) The component weighs 400 pounds (1,780 N) or less, has a center of mass located 4 feet (1.22 m) or less above the adjacent floor level, flexible connections are provided between the component and associated ductwork, piping, and conduit, and the component importance factor (I_p) is 1.0.
 - (b) The component weighs 20 pounds (89 N) or less or, in the case of a distributed system, 5 pounds per foot (73 N/m) or less.
 - 2) Plumbing piping with component importance factor (I_p) of 1.0 and nominal pipe size of 3 inch (80 mm) or less, or with component importance factor (I_p) of 1.5 and nominal pipe size of 1 inch (25 mm) or less, where flexible connections, expansion loops, or other assemblies are provided between piping and associated components, and where piping is positively attached

to the structure; exemption does not apply to piping constructed of low-deformability materials (e.g., cast iron, glass, nonductile plastics).

b. Plumbing Piping Exemptions, All Seismic Design Categories:

1) Plumbing piping where flexible connections, expansion loops, or other assemblies are provided between piping and associated components, where piping is positively attached to the structure, and where one of the following apply:

- (a) Trapeze supported piping weighing less than 10 pounds per foot (146 N/m), where all pipes supported meet size requirements for exemption as single pipes described under specific seismic design category exemptions above.
- (b) Trapeze supported piping with trapeze assemblies using 3/8 inch (10 mm) diameter rod hangers not exceeding 12 inches (305 mm) in length from support point connection to the supporting structure, where all pipes supported have a component importance factor (I_p) of 1.0 and meet size requirements for exemption as single pipes described under specific seismic design category exemptions above, and where the total weight supported by any single trapeze is 100 pounds (445 N) or less.
- (c) Trapeze supported piping with trapeze assemblies using 1/2 inch (13 mm) diameter rod hangers not exceeding 12 inches (305 mm) in length from support point connection to the supporting structure, where all pipes supported have a component importance factor (I_p) of 1.0 and meet size requirements for exemption as single pipes described under specific seismic design category exemptions above, and where the total weight supported by any single trapeze is 200 pounds (890 N) or less.
- (d) Trapeze supported piping with trapeze assemblies using 1/2 inch (13 mm) diameter rod hangers not exceeding 24 inches (610 mm) in length from support point connection to the supporting structure, where all pipes supported have a component importance factor (I_p) of 1.0 and meet size requirements for exemption as single pipes described under specific seismic design category exemptions above, and where the total weight supported by any single trapeze is 100 pounds (445 N) or less.
- (e) Hanger supported piping with individual rod hangers 3/8 inch (10 mm) or 1/2 inch (13 mm) in diameter not exceeding 12 inches (305 mm) in length from support point connection to the supporting structure, where pipe has a component importance factor (I_p) of 1.0 and meets size requirements for exemption as single pipes described under specific seismic design category exemptions above, and where the total weight supported by any single rod is 50 pounds (220 N) or less.

3. Comply with applicable general recommendations of the following, where not in conflict with applicable codes, seismic design criteria, or other specified requirements:

- a. FEMA 412.
- b. FEMA 413.
- c. FEMA 414.
- d. FEMA E-74.
- e. SMACNA (SRM).

D. Seismic Attachments:

- 1. Attachments to be bolted, welded, or otherwise positively fastened without consideration of frictional resistance produced by the effects of gravity.
- 2. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) or qualified evaluation service acceptable to authorities having jurisdiction for compliance with applicable building code, and qualified for seismic applications; concrete anchors to be qualified for installation in both cracked and uncracked concrete.
- 3. Do not use power-actuated fasteners.
- 4. Do not use friction clips (devices that rely on mechanically applied friction to resist loads). Beam clamps may be used for supporting sustained loads where provided with restraining straps.
- 5. Comply with anchor minimum embedment, minimum spacing, minimum member thickness, and minimum edge distance requirements.

- 6. Concrete Housekeeping Pads:
 - a. Increase size of pad as required to comply with anchor requirements.
 - b. Provide pad reinforcement and doweling to ensure integrity of pad and connection and to provide adequate load path from pad to supporting structure.
- E. Seismic Interactions:
 - 1. Include provisions to prevent seismic impact between plumbing components and other structural or nonstructural components.
 - 2. Include provisions such that failure of a component, either essential or nonessential, does not cause the failure of an essential component.
- F. Seismic Relative Displacement Provisions:
 - 1. Use suitable fittings or flexible connections to accommodate:
 - a. Relative displacements at connections between components, including distributed systems (e.g., piping); do not exceed load limits for equipment utility connections.
 - b. Relative displacements between component supports attached to dissimilar parts of structure that may move differently during an earthquake.
 - c. Design displacements at seismic separations.
 - d. Anticipated drifts between floors.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- C. Secure fasteners according to manufacturer's recommended torque settings.
- D. Install flexible piping connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.
- E. Seismic Controls:
 - 1. Provide specified snubbing element air gap; remove any factory-installed spacers, debris, or other obstructions.
 - 2. Use only specified components, anchorage, and hardware evaluated by seismic design. Comply with conditions of seismic certification where applicable.
 - 3. Where mounting hole diameter exceeds bolt diameter by more than 0.125 inch (3 mm), use epoxy grout, elastomeric grommet, or welded washer to reduce clearance to 0.125 inch (3 mm) or less.
 - 4. Equipment with Sheet Metal Housings:
 - a. Use Belleville washers to distribute stress over a larger surface area of the sheet metal connection interface as approved by manufacturer.
 - b. Attach additional steel as approved by manufacturer where required to transfer loads to structure.
 - c. Where mounting surface is irregular, do not shim housing; reinforce housing with additional steel as approved by manufacturer.
 - 5. Concrete Housekeeping Pads:
 - a. Size in accordance with seismic design to meet anchor requirements.
 - b. Install pad reinforcement and doweling in accordance with seismic design to ensure integrity of pad and associated connection to slab.

END OF SECTION

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**SECTION 220719
PLUMBING PIPING INSULATION**

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus 2019.
- B. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form 2020a.
- C. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation 2019.
- D. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel 2008 (Reapproved 2018).
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2021a.
- F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.02 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER INSULATION

- A. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. K (Ksi) Value: ASTM C177, 0.24 at 75 degrees F (0.035 at 24 degrees C).
 - 2. Maximum Service Temperature: 850 degrees F (454 degrees C).
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- B. Fibrous Glass Fabric:
 - 1. Cloth: Untreated; 9 oz/sq yd (305 g/sq m) weight.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturers:
 - 1. Armacell LLC; AP Armaflex: www.armacell.us/#sle.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
 - 1. Minimum Service Temperature: Minus 40 degrees F (Minus 40 degrees C).
 - 2. Maximum Service Temperature: 220 degrees F (104 degrees C).
 - 3. Connection: Waterproof vapor barrier adhesive.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Exposed Piping: Locate insulation and cover seams in least visible locations.
- C. For hot piping conveying fluids 140 degrees F (60 degrees C) or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- D. Glass fiber insulated pipes conveying fluids above ambient temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

- E. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations.
Finish at supports, protrusions, and interruptions. At fire separations, see Section 078400.

3.02 SCHEDULES

A. Plumbing Systems:

1. Domestic Hot Water Supply:
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: [1/2 - 2 inch] ([] mm).
 - 2) Thickness: [1"] inch ([] mm).
 - b. Cellular Foam Insulation:
 - 1) Pipe Size Range: [1/2 - 2] inch ([] mm).
 - 2) Thickness: 1 inch ([] mm).
2. Domestic Cold Water: Insulate same as Hot

END OF SECTION

SECTION 221005 PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sanitary waste piping, buried within 5 feet (1500 mm) of building.
- B. Sanitary waste piping, above grade.
- C. Domestic water piping, buried within 5 feet (1500 mm) of building.
- D. Domestic water piping, above grade.
- E. Storm drainage piping, buried within 5 feet (1500 mm) of building.
 - 1. Storm drainage piping, above grade.
 - 2. Pipe hangers and supports.

1.02 REFERENCE STANDARDS

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2018.
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2018.
- C. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes 2018.
- D. ASME B31.9 - Building Services Piping 2020.
- E. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- F. ASTM B32 - Standard Specification for Solder Metal 2020.
- G. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes 2020.
- H. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2020.
- I. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric) 2020.
- J. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube 2016.
- K. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings 2016.
- L. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems 2020.
- M. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings 2020.
- N. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings 2017.
- O. ASTM D2855 - Standard Practice for the Two-Step (Primer & Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets 2020.
- P. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings 2016.
- Q. ASTM F876 - Standard Specification for Crosslinked Polyethylene (PEX) Tubing 2020b.
- R. ASTM F1960 - Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) and Polyethylene of Raised Temperature (PE-RT) Tubing 2021.
- S. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018.
- T. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends 2010.
- U. NSF 61 - Drinking Water System Components - Health Effects 2020.
- V. NSF 372 - Drinking Water System Components - Lead Content 2020.
- W. PPI TR-4 - PPI Listing of Hydrostatic Design Basis (HDB), Hydrostatic Design Stress (HDS), Strength Design Basis (SDB), Pressure Design Basis (PDB), and Minimum

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 SANITARY WASTE PIPING, BURIED WITHIN 5 FEET (1500 MM) OF BUILDING

- A. PVC Pipe: ASTM D2665 or ASTM D3034.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.03 SANITARY WASTE PIPING, ABOVE GRADE

- A. PVC Pipe: ASTM D2729.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.04 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET (1500 MM) OF BUILDING

- A. Copper Pipe: ASTM B42, annealed.
 - 1. Fittings: ASME B16.26, cast bronze.
 - 2. Joints: Flared.
- B. Cross-Linked Polyethylene (PEX) Pipe: ASTM F876 or ASTM F877.
 - 1. PPI TR-4 Pressure Design Basis:
 - a. 100 psig (689 kPa) at maximum 180 degrees F (82 degrees C).

2.05 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), Drawn (H).
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.
- B. Cross-Linked Polyethylene (PEX) Pipe: ASTM F876 or ASTM F877.
 - 1. Manufacturers:
 - a. SharkBite, a brand of Reliance Worldwide Corporation: www.sharkbite.com/#sle.
 - b. Uponor, Inc: www.uponorengineering.com/#sle.
 - c. Viega LLC: www.viega.us/#sle.
 - 2. PPI TR-4 Pressure Design Basis:
 - a. 100 psig (689 kPa) at maximum 180 degrees F (82 degrees C).
 - 3. Fittings: Brass and engineered polymer (EP) ASTM F1960.
 - 4. Joints: ASTM F1960 cold-expansion fittings.

2.06 STORM DRAINAGE PIPING, ABOVE GRADE

- A. PVC Pipe: ASTM D2665.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.07 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
 - 3. Trapeze Hangers: Welded steel channel frames attached to structure.
 - 4. Vertical Pipe Support: Steel riser clamp.
 - 5. Floor Supports: Concrete pier or steel pedestal with floor flange; fixture attachment.
 - 6. Rooftop Supports for Low-Slope Roofs: Steel pedestals with bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not

- penetrating the roofing assembly, with support fixtures as specified; and as follows:
 - a. Bases: High-density polypropylene.
 - b. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 - c. Steel Components: Stainless steel or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
 - d. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion-resistant material.
- B. Plumbing Piping - Water:
 - 1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch (15 to 40 mm, DN): Malleable iron, adjustable swivel, split ring.
 - 2. Hangers for Cold Pipe Sizes 2 inch (50 mm, DN) and Over: Carbon steel, adjustable, clevis.
 - 3. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- C. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
 - 1. Masonry Wedge Expansion Anchors: Comply with ICC-ES AC01.
 - 2. Other Types: As required.

2.08 BALL VALVES

- A. Construction, 4 inch (100 mm, DN) and Smaller: MSS SP-110, Class 150, 400 psi (2760 kPa) CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded or grooved ends with union.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- G. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- H. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- I. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9.
 - 2. Place hangers within 12 inches (300 mm) of each horizontal elbow.

3.03 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.

3.04 FIELD TESTS AND INSPECTIONS

- A. Verify and inspect systems according to requirements by the Authority Having Jurisdiction. In the absence of specific test and inspection procedures proceed as indicated below.
- B. Domestic Water Systems:
 - 1. Perform hydrostatic testing for leakage prior to system disinfection.

2. Test Preparation: Close each fixture valve or disconnect and cap each connected fixture.
3. General:
 - a. Fill the system with water and raise static head to 10 psi (345 kPa) above service pressure. Minimum static head of 50 to 150 psi (345 to 1,034 kPa). As an exception, certain codes allow a maximum static pressure of 80 psi (551.6 kPa).
- C. Test Results: Document and certify successful results, otherwise repair, document, and retest.

3.05 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed, and clean.
- B. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- C. Inject disinfectant, free chlorine in liquid, powder, tablet, or gas form throughout system to obtain 50 to 80 mg/L residual.
- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

END OF SECTION

**SECTION 221006
PLUMBING PIPING SPECIALTIES**

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. NSF 61 - Drinking Water System Components - Health Effects 2020.
- B. NSF 372 - Drinking Water System Components - Lead Content 2020.

1.02 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.
- B. See Plumbing Schedule on drawings for additional fixtures and devices

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- C. Pipe relief from backflow preventer to service sink.

END OF SECTION

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**SECTION 224000
PLUMBING FIXTURES**

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
- B. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks 2017.
- C. NSF 61 - Drinking Water System Components - Health Effects 2020.
- D. NSF 372 - Drinking Water System Components - Lead Content 2020.

1.02 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.
- B. See Plumbing Schedule in the drawings for additional information and requirements.

2.02 REGULATORY REQUIREMENTS

- A. Comply with applicable codes for installation of plumbing systems.
- B. Perform work in accordance with local health department regulations.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall supports and bolts.
- E. Solidly attach water closets to floor with lag screws. Lead flashing is not intended to hold fixture in place.

3.02 ADJUSTING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

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SECTION 230548
VIBRATION AND SEISMIC CONTROLS FOR HVAC

PART 1 GENERAL

1.01 DEFINITIONS

- A. HVAC Component: Where referenced in this section in regards to seismic controls, applies to any portion of the HVAC system subject to seismic evaluation in accordance with applicable codes, including distributed systems (e.g., ductwork, piping).
- B. Seismic Restraint: Structural members or assemblies of members or manufactured elements specifically designed and applied for transmitting seismic forces between components and the seismic force-resisting system of the structure.

1.02 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASCE 19 - Structural Applications of Steel Cables for Buildings 2016.
- C. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications Most Recent Edition Cited by Referring Code or Reference Standard.
- D. FEMA 412 - Installing Seismic Restraints for Mechanical Equipment 2002.
- E. FEMA 413 - Installing Seismic Restraints for Electrical Equipment 2004.
- F. FEMA 414 - Installing Seismic Restraints for Duct and Pipe 2004.
- G. FEMA E-74 - Reducing the Risks of Nonstructural Earthquake Damage 2012.
- H. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. MFMA-4 - Metal Framing Standards Publication 2004.
- J. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems 2008.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.
 - 1. Vibration Isolators: Include rated load capacities and deflections; include information on color coding or other identification methods for spring element load capacities.
 - 2. Seismic Controls: Include seismic load capacities.

PART 2 PRODUCTS

2.01 VIBRATION ISOLATION REQUIREMENTS

- A. Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing HVAC equipment and/or HVAC connections to vibration-isolated equipment.
- B. Comply with applicable general recommendations of ASHRAE (HVACA), where not in conflict with other specified requirements:
- C. General Requirements:
 - 1. Select vibration isolators to provide required static deflection.
 - 2. Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.

2.02 SEISMIC CONTROL REQUIREMENTS

- A. Design and provide HVAC component restraints, supports, and attachments suitable for seismic loads determined in accordance with applicable codes, as well as gravity and operating loads and other structural design considerations of the installed location. Consider wind loads for outdoor HVAC components.
- B. Seismic Design Criteria: ICC (IBC).
 - 1. Seismic Design Category: D.
 - 2. Risk Category: III.

- C. Component Importance Factor (I_p): HVAC components to be assigned a component importance factor (I_p) of 1.5 unless otherwise indicated.
- D. Seismic Restraints:
 - 1. Provide seismic restraints for HVAC components except where exempt according to applicable codes and specified seismic design criteria, as approved by authorities having jurisdiction.
 - 2. Comply with applicable general recommendations of the following, where not in conflict with applicable codes, seismic design criteria, or other specified requirements:
 - a. ASHRAE (HVACA).
 - b. FEMA 412.
 - c. FEMA 413.
 - d. FEMA 414.
 - e. FEMA E-74.
 - f. SMACNA (SRM).
 - 3. Seismic restraint capacities to be verified by a Nationally Recognized Testing Laboratory (NRTL) or certified by an independent third-party registered professional engineer acceptable to authorities having jurisdiction.
 - 4. Seismic Restraint Systems:
 - a. Except where otherwise restricted, use of either cable or rigid restraints is permitted.
 - b. Use only cable restraints to restrain vibration-isolated HVAC components, including distributed systems.
 - c. Use only one restraint system type for a given HVAC component or distributed system (e.g., ductwork, piping) run; mixing of cable and rigid restraints on a given component/run is not permitted.
 - d. Size restraint elements, including anchorage, to resist seismic loads as necessary to restrain HVAC component in all lateral directions; consider bracket geometry in anchor load calculations.
 - e. Clevis hangers may only be used for attachment of transverse restraints; do not use for attachment of longitudinal restraints.
 - f. Where seismic restraints are attached to clevis hangers, provide clevis bolt reinforcement accessory to prevent clevis hanger deformation.
 - g. Do not introduce lateral loads on open bar joist chords or the weak axis of beams, or loads in any direction at other than panel points unless approved by project Structural Engineer of Record.
 - 5. Ductwork Applications:
 - a. Positively attach appurtenances (e.g., dampers, louvers, diffusers) with mechanical fasteners.
- E. Seismic Attachments:
 - 1. Attachments to be bolted, welded, or otherwise positively fastened without consideration of frictional resistance produced by the effects of gravity.
 - 2. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) or qualified evaluation service acceptable to authorities having jurisdiction for compliance with applicable building code, and qualified for seismic applications; concrete anchors to be qualified for installation in both cracked and uncracked concrete.
 - 3. Do not use power-actuated fasteners.
 - 4. Do not use friction clips (devices that rely on mechanically applied friction to resist loads). Beam clamps may be used for supporting sustained loads where provided with restraining straps.
 - 5. Comply with anchor minimum embedment, minimum spacing, minimum member thickness, and minimum edge distance requirements.
 - 6. Concrete Housekeeping Pads:
 - a. Increase size of pad as required to comply with anchor requirements.
 - b. Provide pad reinforcement and doweling to ensure integrity of pad and connection and to provide adequate load path from pad to supporting structure.
- F. Seismic Interactions:
 - 1. Include provisions to prevent seismic impact between HVAC components and other structural or nonstructural components.

2.03 VIBRATION ISOLATORS

- A. General Requirements:
 - 1. Resilient Materials for Vibration Isolators: Oil, ozone, and oxidant resistant.

2.04 ACOUSTICAL AND VIBRATION ISOLATORS

- A. General Requirements:
 - 1. Acoustical Isolation System: Through-stud isolators, pipe clamps, riser clamp pads, neoprene and felt lining material and associated support brackets.

2.05 SEISMIC RESTRAINT SYSTEMS

- A. Description: System components and accessories specifically designed for field assembly and attachment of seismic restraints.
- B. Cable Restraints:
 - 1. Comply with ASCE 19.
 - 2. Cables: Pre-stretched, galvanized steel wire rope with certified break strength.
 - 3. Cable Connections: Use only swaged end fittings. Cable clips and wedge type end fittings are not permitted in accordance with ASCE 19.
 - 4. Use protective thimbles for cable loops where potential for cable damage exists.
- C. Rigid Restraints: Use MFMA-4 steel channel (strut), steel angle, or steel pipe for structural element; suitable for both compressive and tensile design loads.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- C. Secure fasteners according to manufacturer's recommended torque settings.
- D. Vibration Isolation Systems:
 - 1. Clean debris from beneath vibration-isolated equipment that could cause short-circuiting of isolation.
 - 2. Use elastomeric grommets for attachments where required to prevent short-circuiting of isolation.
 - 3. Adjust isolators to be free of isolation short circuits during normal operation.
 - 4. Do not overtighten fasteners such that resilient material isolator pads are compressed beyond manufacturer's maximum recommended deflection.
- E. Seismic Controls:
 - 1. Provide specified snubbing element air gap; remove any factory-installed spacers, debris, or other obstructions.
 - 2. Use only specified components, anchorage, and hardware evaluated by seismic design. Comply with conditions of seismic certification where applicable.
 - 3. Where mounting hole diameter exceeds bolt diameter by more than 0.125 inch (3 mm), use epoxy grout, elastomeric grommet, or welded washer to reduce clearance to 0.125 inch (3 mm) or less.
 - 4. Equipment with Sheet Metal Housings:
 - a. Use Belleville washers to distribute stress over a larger surface area of the sheet metal connection interface as approved by manufacturer.
 - b. Attach additional steel as approved by manufacturer where required to transfer loads to structure.
 - c. Where mounting surface is irregular, do not shim housing; reinforce housing with additional steel as approved by manufacturer.
 - 5. Concrete Housekeeping Pads:
 - a. Size in accordance with seismic design to meet anchor requirements.
 - b. Install pad reinforcement and doweling in accordance with seismic design to ensure integrity of pad and associated connection to slab.
 - 6. Seismic Restraint Systems:
 - a. Do not attach seismic restraints and gravity supports to dissimilar parts of structure that may move differently during an earthquake.
 - b. Install restraints within permissible angles in accordance with seismic design.

- c. Install cable restraints straight between component/run and structural attachment; do not bend around other nonstructural components or structural elements.
- d. Install cable restraints for vibration-isolated components slightly slack to prevent short-circuiting of isolation.
- e. Install hanger rod stiffeners where indicated using only specified clamps; do not weld stiffeners to hanger rod.

END OF SECTION

**SECTION 233100
HVAC DUCTS AND CASINGS**

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- B. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.
- C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2005 (Revised 2009).

1.02 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for duct materials.

PART 2 PRODUCTS

2.01 DUCT ASSEMBLIES

- A. Regulatory Requirements: Construct ductwork to comply with NFPA 90A standards.
- B. General Exhaust: 1/2 inch wg (125 Pa) pressure class, galvanized steel.
- C. Outside Air Intake: 1/2 inch wg (125 Pa) pressure class, galvanized steel.

2.02 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.

2.03 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

END OF SECTION

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SECTION 260526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL 467 - Grounding and Bonding Equipment Current Edition, Including All Revisions.

1.02 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- D. Grounding System Resistance:
 - 1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- E. Bonding and Equipment Grounding:
 - 1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
 - 2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
 - 3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
 - 4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 - 5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
 - 6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
 - 1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 - 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 260526:
 - 1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).

- C. Connectors for Grounding and Bonding:
 - 1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 - 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
 - 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
 - 1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches (150 mm) below finished grade.
- D. Make grounding and bonding connections using specified connectors.
 - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- E. Identify grounding and bonding system components in accordance with Section 260553.

END OF SECTION

**SECTION 260529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2019.
- D. MFMA-4 - Metal Framing Standards Publication 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.02 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.

1.03 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Comply with applicable building code.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
 - 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 - 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
 - 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 - 5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
 - 6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
 - 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 - 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
 - 1. Manufacturers:
 - a. Cooper Crouse-Hinds, a division of Eaton Corporation:
www.cooperindustries.com/#sle.
- D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.

1. Comply with MFMA-4.
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
- F. Anchors and Fasteners:
 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 2. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 3. Hollow Masonry: Use toggle bolts.
 4. Hollow Stud Walls: Use toggle bolts.
 5. Steel: Use beam clamps, machine bolts, or welded threaded studs.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Equipment Support and Attachment:
 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Secure fasteners according to manufacturer's recommended torque settings.
- I. Remove temporary supports.

END OF SECTION

SECTION 260533.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2015.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S) 2015.
- C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit (EIMC) 2018.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT) 2013.
- F. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC) 2017.
- G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- H. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit 2018.
- I. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit 2020.
- J. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing 2016.
- K. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. UL 1 - Flexible Metal Conduit Current Edition, Including All Revisions.
- M. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.
- N. UL 360 - Liquid-Tight Flexible Steel Conduit Current Edition, Including All Revisions.
- O. UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.
- P. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings Current Edition, Including All Revisions.
- Q. UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.
- R. UL 1242 - Electrical Intermediate Metal Conduit-Steel Current Edition, Including All Revisions.

1.02 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
 - 1. Under Slab on Grade: Use galvanized steel rigid metal conduit, rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
 - 2. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
 - 3. Where steel conduit is installed in direct contact with earth where soil has a resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape to provide supplementary corrosion protection or use PVC-coated galvanized steel rigid metal

- conduit.
- 4. Where steel conduit emerges from concrete into soil, use corrosion protection tape to provide supplementary corrosion protection for a minimum of 4 inches (100 mm) on either side of where conduit emerges or use PVC-coated galvanized steel rigid metal conduit.
- D. Embedded Within Concrete:
 - 1. Within Slab on Grade: Not permitted.
 - 2. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from concrete.
- E. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- F. Concealed Within Hollow Stud Walls: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- G. Concealed Above Accessible Ceilings: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- H. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.
- I. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or electrical metallic tubing (EMT).
- J. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).
- K. Exposed, Exterior: Use galvanized steel rigid metal conduit.
- L. Connections to Vibrating Equipment:
 - 1. Dry Locations: Use flexible metal conduit.
 - 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
 - 3. Maximum Length: 6 feet (1.8 m) unless otherwise indicated.

2.02 CONDUIT REQUIREMENTS

- A. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Minimum Conduit Size, Unless Otherwise Indicated:
 - 1. Branch Circuits: 3/4 inch (21 mm) trade size.
 - 2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
- D. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B. Fittings:
 - 1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 INTERMEDIATE METAL CONDUIT (IMC)

- A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- B. Fittings:
 - 1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.05 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.
- B. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil (1.02 mm).
- C. PVC-Coated Fittings:
 - 1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
 - 2. Non-Hazardous Locations: Use fittings listed and labeled as complying with UL 514B.
 - 3. Material: Use steel or malleable iron.
 - 4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil (1.02 mm).
- D. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil (0.38 mm).

2.06 FLEXIBLE METAL CONDUIT (FMC)

- A. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.

2.07 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.

2.08 ELECTRICAL METALLIC TUBING (EMT)

- A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use compression (gland) type.
 - a. Do not use indenter type connectors and couplings.

2.09 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- B. Fittings:
 - 1. Manufacturer: Same as manufacturer of conduit to be connected.
 - 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install intermediate metal conduit (IMC) in accordance with NECA 101.
- E. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by the manufacturer.

- F. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- G. Conduit Routing:
 - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 - 2. Conceal all conduits unless specifically indicated to be exposed.
 - 3. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
 - 4. Route conduits above water and drain piping where possible.
- H. Conduit Support:
 - 1. Secure and support conduits in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
 - 3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
- I. Connections and Terminations:
 - 1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 - 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 - 3. Use suitable adapters where required to transition from one type of conduit to another.
 - 4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
 - 5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 - 6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
 - 7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- J. Penetrations:
 - 1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 - 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 - 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
 - 4. Conceal bends for conduit risers emerging above ground.
 - 5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
 - 6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 - 7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
 - 8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- K. Underground Installation:
 - 1. Minimum Cover, Unless Otherwise Indicated or Required:
 - a. Underground, Exterior: 24 inches (610 mm).
 - b. Under Slab on Grade: 12 inches (300 mm) to bottom of slab.
- L. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
 - 1. Where conduits cross structural joints intended for expansion, contraction, or deflection.

2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
 3. Where conduits are subject to earth movement by settlement or frost.
- M. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
 2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- N. Provide grounding and bonding in accordance with Section 260526.

3.02 FIELD QUALITY CONTROL

- A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- B. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.
- C. Correct deficiencies and replace damaged or defective conduits.

END OF SECTION

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SECTION 260533.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2010.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports 2013.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- I. UL 508A - Industrial Control Panels Current Edition, Including All Revisions.
- J. UL 514A - Metallic Outlet Boxes Current Edition, Including All Revisions.

1.02 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.

PART 2 PRODUCTS

2.01 BOXES

- A. General Requirements:
 - 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 - 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 - 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 - 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 - 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:
 - 1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 - 2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
 - 3. Use suitable concrete type boxes where flush-mounted in concrete.
 - 4. Use suitable masonry type boxes where flush-mounted in masonry walls.
 - 5. Use raised covers suitable for the type of wall construction and device configuration where required.
 - 6. Use shallow boxes where required by the type of wall construction.
 - 7. Do not use "through-wall" boxes designed for access from both sides of wall.
 - 8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 - 9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 - 10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting

- of luminaire where required.
11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
 12. Wall Plates: Comply with Section 262726.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
 - a. Indoor Clean, Dry Locations: Type 1, painted steel.
 - b. Outdoor Locations: Type 3R, painted steel.
 3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Box Locations:
 1. Locate boxes to be accessible. Provide access panels in accordance with Section 083100 as required where approved by the Architect.
 2. Locate boxes as required for devices installed under other sections or by others.
 3. Locate boxes so that wall plates do not span different building finishes.
- E. Box Supports:
 1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
- F. Install boxes plumb and level.
- G. Flush-Mounted Boxes:
 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch (6 mm) or does not project beyond finished surface.
 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch (3 mm) at the edge of the box.
- H. Install boxes as required to preserve insulation integrity.
- I. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- J. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- K. Close unused box openings.
- L. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- M. Provide grounding and bonding in accordance with Section 260526.

END OF SECTION

SECTION 260553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. UL 969 - Marking and Labeling Systems Current Edition, Including All Revisions.

1.02 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Panelboards:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
 - 2. Service Equipment:
 - a. Use identification nameplate to identify each service disconnecting means.
 - 3. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
 - a. Service equipment.
 - 4. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
- B. Identification for Conductors and Cables:
 - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 260519.
 - 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
 - 1. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
 - 2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.
 - 3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
 - 4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
 - 5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch (25 mm) high; Four, located at corners for larger sizes.
- B. Identification Labels:

1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
 2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.
- C. Format for Receptacle Identification:
1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).
 2. Legend: Power source and circuit number or other designation indicated.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height: 3/16 inch (5 mm).
 5. Color: Black text on clear background.
- D. Format for Control Device Identification:
1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).
 2. Legend: Load controlled or other designation indicated.
 3. Text: All capitalized unless otherwise indicated.
 4. Minimum Text Height: 3/16 inch (5 mm).
 5. Color: Black text on clear background.

2.03 WARNING SIGNS AND LABELS

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B. Warning Labels:
1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
 3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
1. Surface-Mounted Equipment: Enclosure front.
 2. Flush-Mounted Equipment: Inside of equipment door.
 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 4. Elevated Equipment: Legible from the floor or working platform.
 5. Interior Components: Legible from the point of access.
 6. Conductors and Cables: Legible from the point of access.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

END OF SECTION

SECTION 262100
LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. IEEE C2 - National Electrical Safety Code 2017.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. No later than two weeks following date of the Agreement, notify Utility Company of anticipated date of service.
- B. Coordination:
 - 1. Verify the following with Utility Company representative:
 - a. Utility Company requirements, including division of responsibility.
 - b. Exact location and details of utility point of connection.
 - c. Utility easement requirements.
 - 2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for electrical service and associated equipment.
 - 3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- C. Arrange for Utility Company to provide permanent electrical service. Prepare and submit documentation required by Utility Company.
- D. Scheduling:
 - 1. Arrange for inspections necessary to obtain Utility Company approval of installation.

1.03 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. IEEE C2 (National Electrical Safety Code).
 - 2. NFPA 70 (National Electrical Code).
 - 3. The requirements of the Utility Company.

PART 2 PRODUCTS

2.01 ELECTRICAL SERVICE REQUIREMENTS

- A. Provide new electrical service consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.
- B. Electrical Service Characteristics: As indicated on drawings.
- C. Utility Company: PLWC.
- D. Division of Responsibility: As indicated on drawings.
- E. Products Furnished by Contractor: Comply with Utility Company requirements.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and Utility Company requirements.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Provide required support and attachment components in accordance with Section 260529.
- E. Provide grounding and bonding for service entrance equipment in accordance with Section 260526.

- F. Identify service entrance equipment, including main service disconnect(s) in accordance with Section 260553.

END OF SECTION

SECTION 262416 PANELBOARDS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e (Amended 2017).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards 2015.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- E. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less 2013.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- I. UL 67 - Panelboards Current Edition, Including All Revisions.
- J. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures Current Edition, Including All Revisions.
- K. UL 869A - Reference Standard for Service Equipment Current Edition, Including All Revisions.

1.02 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.

1.03 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 PANELBOARDS - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Short Circuit Current Rating:
 - 1. Label equipment utilizing series ratings as required by NFPA 70.
- C. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- F. Bussing: Sized in accordance with UL 67 temperature rise requirements.
 - 1. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- G. Conductor Terminations: Suitable for use with the conductors to be installed.
- H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 - 2. Boxes: Galvanized steel unless otherwise indicated.

- a. Provide wiring gutters sized to accommodate the conductors to be installed.
- 3. Fronts:
 - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
 - b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
- 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

2.02 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
 - 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 - 2. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 - 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
 - 3. Conductor Terminations:
 - a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - 4. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
 - 5. Do not use handle ties in lieu of multi-pole circuit breakers.
 - 6. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 260529.
- F. Install panelboards plumb.
- G. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches (2000 mm) above the floor or working platform.
- H. Provide grounding and bonding in accordance with Section 260526.
- I. Install all field-installed branch devices, components, and accessories.
- J. Provide filler plates to cover unused spaces in panelboards.

END OF SECTION

SECTION 262726 WIRING DEVICES

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for 2017h.
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification) 2017g.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2010.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2015).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2016.
- G. UL 20 - General-Use Snap Switches Current Edition, Including All Revisions.
- H. UL 498 - Attachment Plugs and Receptacles Current Edition, Including All Revisions.
- I. UL 514D - Cover Plates for Flush-Mounted Wiring Devices Current Edition, Including All Revisions.
- J. UL 943 - Ground-Fault Circuit-Interrupters Current Edition, Including All Revisions.

1.02 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

PART 2 PRODUCTS

2.01 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices Installed in Finished Spaces: White with stainless steel wall plate.
- C. Wiring Devices Installed in Unfinished Spaces: White with stainless steel wall plate.
- D. Wiring Devices Installed in Wet or Damp Locations: White with specified weatherproof cover.

2.02 WALL SWITCHES

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell.com/#sle.
- B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- C. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.03 RECEPTACLES

- A. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 - 2. NEMA configurations specified are according to NEMA WD 6.
- B. Convenience Receptacles:
 - 1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
- C. GFCI Receptacles:

1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
2. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

2.04 WALL PLATES

- A. Wall Plates: Comply with UL 514D.
 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 2. Size: Standard.
 3. Screws: Metal with slotted heads finished to match wall plate finish.
- B. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.
- C. Weatherproof Covers for Wet or Damp Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of wiring devices provided under this section.
 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switches: 48 inches (1200 mm) above finished floor.
 - b. Fan Speed Controllers: 48 inches (1200 mm) above finished floor.
 - c. Receptacles: 18 inches (450 mm) above finished floor or 6 inches (150 mm) above counter.
 2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches (150 mm) long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- J. Install wall switches with OFF position down.
- K. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- L. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

- M. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

END OF SECTION

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SECTION 264300 SURGE PROTECTIVE DEVICES

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 1449 - Standard for Surge Protective Devices Current Edition, Including All Revisions.

1.02 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include detailed component information, voltage, surge current ratings, repetitive surge current capacity, voltage protection rating (VPR) for all protection modes, maximum continuous operating voltage (MCOV), nominal discharge current (I-n), short circuit current rating (SCCR), connection means including any required external overcurrent protection, enclosure ratings, outline and support point dimensions, weight, service condition requirements, and installed features.

PART 2 PRODUCTS

2.01 SURGE PROTECTIVE DEVICES - GENERAL REQUIREMENTS

- A. Description: Factory-assembled surge protective devices (SPDs) for 60 Hz service; listed, classified, and labeled as suitable for the purpose intended; system voltage as indicated on the drawings.
- B. Unless otherwise indicated, provide field-installed, externally-mounted or factory-installed, internally-mounted SPDs.
- C. List and label as complying with UL 1449, Type 1 when connected on line side of service disconnect overcurrent device and Type 1 or 2 when connected on load side of service disconnect overcurrent device.
- D. Protected Modes:
 - 1. Single Split Phase Systems: L-N, L-G, N-G, L-L.
- E. UL 1449 Voltage Protection Ratings (VPRs):
 - 1. 240/120V System Voltage: Not more than 1,000 V for L-N, L-G, and N-G modes and 1,200 V for L-L mode.
- F. UL 1449 Maximum Continuous Operating Voltage (MCOV): Not less than 115% of nominal system voltage.
- G. Enclosure Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - 1. Indoor clean, dry locations: Type 1.

2.02 SURGE PROTECTIVE DEVICES FOR SERVICE ENTRANCE LOCATIONS

- A. Surge Protective Device - Basis of Design: Surge Suppression, LLC (SSI); SpecPRO Series; Model SSMA8 (80 kA/phase, Type 2, I-n = 10 kA); www.surgesuppression.com/#sle.
 - 1. Voltage: As indicated on drawings.
 - 2. Features: Seven modes of protection; component-level thermal fusing; internal circuit board-mounted overcurrent fusing; 200 kAIC SCCR; 15 year warranty.
 - 3. Include the following options:
 - a. DIAGNOSTIC OPTIONS----->
 - b. AC10 - Basic internal audible alarm with dry relay contacts.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

- C. Do not energize SPD until bonding of neutral and ground for service entrance and separately derived systems is complete in accordance with Section 260526 where applicable. Replace SPDs damaged by improper or missing neutral-ground bond.

END OF SECTION

SECTION 265100 INTERIOR LIGHTING

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems 2006.
- B. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems 2006.

1.02 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.

PART 2 PRODUCTS: SEE DRAWINGS FOR FIXTURE SCHEDULE

PART 3 EXECUTION

3.01 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- D. Provide required support and attachment in accordance with Section 260529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Install accessories furnished with each luminaire.
- G. Bond products and metal accessories to branch circuit equipment grounding conductor.
- H. Emergency Lighting Units:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
- I. Exit Signs:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

END OF SECTION

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SECTION 265600 EXTERIOR LIGHTING

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems 2006.

1.02 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.

PART 2 PRODUCTS: SEE DRAWINGS FOR FIXTURE SCHEDULE

PART 3 EXECUTION

3.01 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.02 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires in accordance with NECA/IESNA 501.
- D. Provide required support and attachment in accordance with Section 260529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Install accessories furnished with each luminaire.
- G. Bond products and metal accessories to branch circuit equipment grounding conductor.
- H. Install lamps in each luminaire.

END OF SECTION

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