PROJECT MANUAL

Arkansas State Veterans Cemetery – Birdeye Rebid

Phase 2

3600 HWY 163, Birdeye, Arkansas 72324

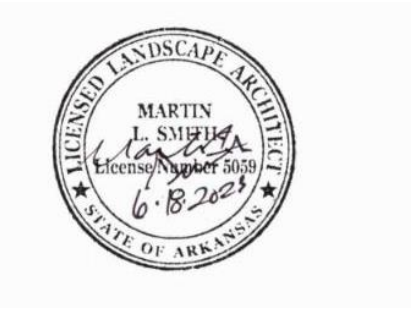
Veterans Cemetery Grants Services
#AR-21-08
Division of Building Authority
#3852301

100% Construction Documents

Arkansas Department of Veterans Affairs
501 Woodlane Drive, Suite 401N
Little Rock, Arkansas, 72114

Governor
Sarah Huckabee Sanders

Secretary
Major General Kendall W. Penn



June 18, 2023

Prepared By:
Ecological Design Group, Inc.
120 South Izard Street
Little Rock, Arkansas 72201
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DBA PROJECT NUMBER: TBD

INVITATION TO BID
Section 00 11 16 / Rev: August 2021

Ecological Design Group, Inc.	Arkansas State Veterans Cemetery - Birdeye Phase II
120 South Izard Street	DBA Project #: 3852301R
Little Rock, Arkansas 72201	Owner/Agency: Arkansas Department of Veterans Affairs
870-588-6426	

1) You are invited to bid on a General Contract for the:
   Construction of: Arkansas State Veterans Cemetery - Birdeye Phase II
   Located At: 3600 HWY 163, Birdeye, Arkansas 72324
   Project Owner: Arkansas Department of Veterans Affairs
   Bid Type: Lump Sum Basis: Lowest Responsive and Responsible Bidder

2) There will be a Pre-Bid Conference
   Date: Tuesday, June 27, 2023
   Time: 2:00 p.m.
   Location: Arkansas State Veterans Cemetery Administration Building, 3600 HWY 163, Birdeye, Arkansas 72324
   The State reserves the right to schedule future meetings.

3) The Owner will receive bids until:
   Date: Tuesday, August 8, 2023
   Time: 2:00 p.m.
   Location: Division of Building Authority, 501 Woodlane Street, Suite 101N, Little Rock, Arkansas 72201

   Sealed bids may be mailed or delivered to the above address. Bids received after the date and time stated in the solicitation and will not be considered. Bids will be publicly opened and read aloud at the time and date mentioned. Interested parties are invited to attend. The Division of Building Authority, hereinafter termed DBA, unless designated to another entity, supervises the bidding and award of all construction contracts, approves contract change orders, request for final payment and ensures on-site observations are accomplished.

4) Obtaining contract documents through any source other than the Design Professional listed above or their representative(s) is not advisable due to the risks of receiving incomplete or inaccurate information. Contract documents obtained through the Design Professional or their representative(s) are considered the official version and take precedence should any discrepancies occur. The official version of the complete set of the contract documents should be examined and are obtainable from:
   Ecological Design Group, Inc., 120 South Izard Street, Little Rock, Arkansas 72201. Prime bidders will be furnished three (3) sets of bidding documents at Southern Reprographics, 901 West 7th Street, Little Rock, Arkansas 72201, (501)372-4011.

5) Bid document deposit and refund information:
   Bidders must deposit a check in the amount of $150.00 per set, payable to Ecological Design Group, Inc. Deposits will be refunded to all prime bidders who return bidding documents in good condition within ten (10) days after the opening of bids. A bidder receiving a contract award may retain the bidding documents and the Bidder's deposit will be refunded. Prime Bidders requiring additional sets and Sub-bidders may purchase bidding documents through Southern Reprographics.

6) While contract documents can be examined at the following plan room(s), bidders should use caution in doing so:

Southern Reprographics, 901 W 7th St, Little Rock, Arkansas 72201, Phone Number (501)372-4011.

N/A

7) Bid Security in the amount of five (5) percent of the bid must accompany each bid in accordance with the Instructions to Bidders.

8) Bidders are hereby notified that any bidder who desires to enter into Contract for this work must comply with disclosure requirements pursuant to Governor Executive Order 98-04. Submission to the Owner and DBA of the completed Disclosure (DBA 00 73 73) form will be a condition of the Contract. The Owner cannot enter into any contract nor can DBA approve any contract, which does not obligate the Contractor to require the submission of Disclosure (DBA 00 73 73) forms for subcontracts exceeding $25,000.

9) Bidders are hereby notified that Davis-Bacon prevailing wage rates and other Federal regulations will apply.

10) The State reserves the rights to reject any and all bids, and to waive any formalities. Bidders shall conform to the requirements of the Arkansas licensing laws and regulations for contractors, and shall be licensed before his bid is submitted unless the project is federally funded pursuant to Arkansas Code Annotated § 17-25-315.

11) Pursuant to Ark. Code Ann. § 22-9-203, the State encourages all small, minority, and women business enterprises to submit bids for capital improvements. Encouragement is also made to all general contractors that in the event they subcontract portions of their work, consideration is given to the identified groups.

12) Pursuant to Ark. Code Ann. § 19-11-105, the lowest responsible bidder shall certify prior to executing the contract that they do not employ or contract with any illegal immigrants. Bidders shall certify online at: https://www.ark.org/dfa/immigrant/index.php/user/login

13) Bidders are responsible to adhere to the guidelines established for state operated buildings. Face coverings should be worn upon entering the facility and whenever moving through common areas (lobbies, elevators, stairs, restrooms, meetings and hallway/corridors). Bidders without a face covering may be denied access at the point of entry. Due to social distancing requirements and health/safety concerns, prompt entrance to the building may not occur therefore, Bidders should be prepared for any delays into the building for a timely bid submittal.

To: **All Bidders**
From: **Division of Building Authority, Construction Section**
Re: **Common Bidding Mistakes**
Date: **4/1/2017**

The following list* are the eleven most common mistakes which occur in the bid submittal process and result in bid rejections.

1) Not listing the Subcontractor's name or the Contractors name (Mechanical, Plumbing, Electrical, Roofing) in the space provided on the bid form.

2) The listed Subcontractor's is unlicensed to do the listed work.

3) Bid Bond is not signed by a resident / non resident agent licensed within Arkansas.

4) Addenda are not acknowledged by the Contractor on the Bid Form.

5) Failure to submit any bid security or the issuing surety company for the Bid Bond is not qualified and authorized to do business within the State and is not listed on the current United States Department of the Treasury's listing of approved sureties.

6) Bid Bond or Bid Form is not signed by the Contractor or Contractors representative.

7) Expired Contractor's license or is misclassified for the work.

8) Bid Bond not accompanied by the Agent's Power of Attorney, or the name of the resident / non resident agent is not shown on the Power of Attorney.

9) Bid Security (Bid Bond or Cashiers Check) made out to the wrong entity (Obligee or Payee), the bid security must be made out to the Owner.

10) Failure to submit attachments, such as unit prices, with the bid form, if required by the bid documents.

11) Bidder fails to initial any revised entries on the submitted bid form. All changes shall be made by striking through the wrong entry and the corrected entry shall be inserted on the Bid Form and initialed.

*This is NOT an all inclusive checklist and is only being provided as informational assistance to bidders. Bidders should become familiar with all the bid documents, procedures, rules and laws governing bid submittals and state contracting processes.

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INSTRUCTIONS TO BIDDERS
Section 00 21 13 / Rev: August 2021

1. **BIDDING DOCUMENTS**. Bidders may obtain complete sets of Contract Documents from issuing office designated in the Invitation to Bid. Complete sets of Contract Documents must be used in preparing bids; neither Owner nor Design Professional assume responsibility for errors or misinterpretations resulting from the use of incomplete sets of Contract Documents. Obtaining Contract documents through any source other than the Design Professional listed in the Invitation to Bid is not advisable due to the risks of receiving incomplete or inaccurate information, and the bidder runs the risk of basing bidder's proposal on such information. The documents obtained through the Design Professional or his representative(s) or DBA are considered the official version and take precedence if any discrepancies occur. The fact that documents used for bidding purposes are named "contract documents" does not diminish in any way the right of the State to reject any and all bids and to waive any formality.

2. **EXAMINATION OF DRAWINGS, SPECIFICATIONS AND SITE OF WORK**. Bidder shall examine the Contract Documents and visit the project site of work. Bidder shall become familiar with all existing conditions and limitations under which the Work is to be performed, and shall base bid on items necessary to perform the Work as set forth in the Contract Documents. Failure to do so is at the sole risk of the bidder. No allowance will be made to Bidder because of lack of such examination or knowledge. The submission of a Bid shall be construed as conclusive evidence that the Bidder has made such examination.

3. **INTERPRETATION OF CONTRACT DOCUMENTS DURING BIDDING**.

3.1 All references to the Owner shall be interpreted to mean the Agency for whom the work is being contracted.

3.2 If any person contemplating submitting a Bid is in doubt as to the true meaning of any part of the Contract Documents or finds discrepancies in or omissions from any part of the Contract Documents, he may submit to the Design Professional a written request for an interpretation or correction thereof not later than five (5) calendar days before Bid opening. In those instances where a Design Professional is not involved with the project, written requests for interpretation or correction may be made to the DBA Construction Section within the time frame stated above. Bidders shall not make additions, notations, clarifications, reservations, or exceptions to the bid form proposal or include additional documents regarding additions, notations, clarifications, reservations, or exceptions. See also # 6.1. Segregated bids, alternate bids or assignments ("additions") shall not be considered. The reading of a bid is not inclusive of the Bidder's additions, notations, clarifications, reservations, or exceptions and shall not change the Bidder's responsibilities and duties to provide all labor, materials, services and equipment necessary for, or incidental to, the construction of the project pursuant to the contract documents, including the time set forth and the lump sum base bid stated in the bid proposal.

3.3 Address all communications regarding the Contract Documents to the Design Professional.

In those instances where a Design Professional is not involved, address all such communications to DBA Construction Section, 501 Woodlane, Suite 101N, Little Rock, AR 72201 (501-682-1833).

3.4 Interpretation or correction of the Contract Documents will be made only by Addendum and will be issued by fax transmission to, hand delivered to, electronic notification to or picked up by potential bidders who received plans and specifications from the official plan distribution entity. The Design Professional shall be responsible for issuance of all addenda and documentation relating to its issuance (not receipt). In those instances where a Design Professional is not involved, the DBA Construction Section shall distribute Addenda in the above referenced manner. Bidders are responsible for verifying if any Addenda were issued prior to bid submittal. The State will not be responsible for oral explanations or interpretation of the Contract Documents.

3.5 Addenda issued during the bidding period will be incorporated into the Contract Documents.

4. **SUBSTITUTIONS.**

4.1 Materials, products, and equipment described in the Contract Documents establish a standard of required function and a minimum desired quality or performance level, or other minimum dimensions and capacities, to be met by any proposed substitution. Acceptability of substitutions will not be considered during bidding period.

4.2 In some cases, prior approval of material or equipment, or both shall be obtained from Owner in order to obtain the desired color, size, visual appearance, and other features specified.

5. **TYPE OF BID**.

5.1 The Work under this Contract will be awarded under a stipulated sum contract to the lowest responsive and responsible base bid amount. No segregated bids, alternate bids, or assignments will be considered.

5.2 The estimate of quantities is approximate only and shall be the basis for receiving unit price bids for each item, but shall not be considered by the Bidder as the actual quantities that may be required for the completion of the proposed work. Bidder shall state a unit price for every item of work named in the Proposal. Bidder shall include, in the unit prices, furnishing of labor, materials, tools, equipment, and apparatus of every description to construct, erect, and finish the Work. The unit price bid for the items shall be shown numerically and in the appropriate spaces provided on the Bid Form. Such figures shall be clear and distinctly legible so that no question can arise as to their intent or meaning. Unit price bids and totals shown in the Bid Form shall not include costs of engineering, advertising, printing and appraising.

6. **PREPARATION OF BID.**

6.1 Bid shall be made on an unaltered Bid Form identical to the form included with the Contract Documents. Fill in all blank spaces and submit one original. Bidders shall not strike through or add language to the bid form unless Bidders are modifying language previously inserted by the bidders themselves. Bidders should contact the DBA Construction Section for questions or concerns regarding the bid form. If this solicitation requires bidding on all items, failure to do so will disqualify the bid. Bidder shall furnish all information required by the solicitation and bid documents. Bids shall be signed with name printed below the signature. The Contractor's license number issued by the Contractors Licensing Board shall be placed on the Bid Form whenever the total project amount is $50,000 or more.

Where Bidder is a corporation, bids shall be signed with the legal name of the corporation and the signature of an authorized officer of the corporation. Bids signed by an agent shall be accompanied by evidence of that agent's authority. The name of the state of incorporation, contractor's license number issued by the Contractors Licensing Board should be listed. Bids submitted by contractors who are not properly licensed shall be rejected.

6.2 Bids submitted by a "Joint Venture/Joint Adventure" shall be signed by representatives of each component part of the Joint Venture/Joint Adventure. The licenses of each component part of the Joint Adventure should also be listed in the bid submittal. Therefore, joint adventure bidders shall indicate at least two (2) signatures and should indicate 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.

6.3 Bidder shall not enter into an agreement for any portion of the Work (services, materials, supplies, equipment, etc.) throughout the term of the Contract with any design professional (or firm) who is under contract to the Owner to provide administration of the Contract.

7. **BID GUARANTEE AND BONDS**.

7.1 Each bid proposal shall include a bid security in the amount of five percent of the total bid offered, if the bid is in excess of $50,000.00. The bidder will be required to submit a bid security, which includes enclosing a cashiers check payable to the order of the OWNER drawn upon a bank or trust company doing business in Arkansas or by a corporate bid bond in an amount equal to five (5) percent of the bid. The bidder shall include in the bid the bid bond amount so that the bid represents the total cost to the Owner of all work included in the contract. Bid bonds shall be made by a surety company qualified and authorized to do business in the State of Arkansas and are listed on the current United States Department of the Treasury's listing of approved sureties. The bid bond shall be executed by a resident or non-resident agent who is licensed by the Arkansas Insurance Commissioner to represent the surety company executing the bond. The agent shall file a power of attorney to act on the behalf of the bonding company with the bid bond. Bidders may utilize a DBA Bid Bond form, however they are not required to do so; other bid bond formats are acceptable.

In any event, regardless of the type of bid security or the format of the bid bond chosen by the Bidder, failure to submit a valid bid security in accordance with Arkansas laws and regulations, including a power of attorney with the bid bond, shall render the bidders proposal void.

7.2 The bid security shall indemnify the Owner against failure of the Contractor to execute and deliver the contract and necessary bond (Performance and Payment Bond) for faithful performance of the contract. The bid security shall provide that the contractor or surety must pay the damage, loss, cost and expense subject to the amount of the bid security directly arising out of the Contractor's default in failing to execute and deliver the contract and bonds.

7.3 Owner will have the right to retain the bid security of bidders to whom an award is being considered until the Contract has been executed and bonds if required, have been furnished, or until specified time has elapsed so that bids may be withdrawn, or all bids have been rejected.

7.4 Failure to execute the Contract and file an acceptable full payment and performance bond and proof of insurance within the time frame as stated in 6(b) of Section 00 41 13 Bid Form after the intent to award has been issued to the bidder shall be just cause for the cancellation of the award and forfeiture of the bid security, which shall become the property of the agency, not as a penalty but in liquidated damages sustained. Award may then be made to the next lowest responsible bidder, or the work may be rebid and constructed under contract or otherwise as the State determines. The responsible low bidder who fails to execute the Contract and submit an acceptable payment and performance bond and proof of insurance will not be permitted to bid on any subsequent advertisement of that project.

8. **PERFORMANCE AND PAYMENT BOND**. Performance and Payment Bonds are not required for bids $50,000.00 or under, except for roofing projects. For work exceeding $50,000.00, the Contractor shall furnish a Performance and Payment Bond in the amount equal to 100 percent of contract price, on a form identical to the Performance and Payment Bond Form included with the Contract Documents as security for faithful performance of the Contract and payment of all obligations arising thereunder within the time frame as stated in 6(b) of Section 00 41 13 Bid Form after receipt of the Intent to Award. The bond shall be executed by a surety company qualified and authorized to do business in the State of Arkansas and are listed on the current United States Department of the Treasury's listing of approved sureties. The bond shall be executed by a resident or non-resident agent licensed by the State Insurance Commissioner, to represent the surety company and the agent shall file with the bond the power of attorney of the agent to act on behalf of the bonding company. The bond shall be written in favor of the Owner. Contractor shall file the bond with the Circuit Clerk in the county where the Work is to be performed.

Failure to deliver said bonds, as specified, shall be considered as having abandoned the Contract and the bid security will be retained as liquidated damages. The bidder shall include in the bid the Performance and Payment bond amount so that the bid represents the total cost to the Owner of all work included in the contract.

9. **LISTING OF SUBCONTRACTORS.**

9.1 **LISTING OF SUBCONTRACTORS**. Name of principal Subcontractors or Prime Contractor (Mechanical {HVACR}, Plumbing, Electrical and Roofing) shall be listed where indicated on the Bid Form in accordance with Ark. Code Ann. § 22-9-204 and the contract documents. All prime contractors, as a condition to perform construction work for and in the State of Arkansas, shall use no other Subcontractors, including his own forces when the Subcontractor's portion of the project is $50,000.00 or more, except those qualified and licensed by the Contractors Licensing Board in Mechanical (HVACR), Plumbing, Electrical and Roofing. Those principal Subcontractors or Prime Contractor listed in these spaces must be properly licensed for the listed work performed as determined by the Contractors Licensing Board (CLB). The bidder must also be properly licensed and use licensed Subcontractors for all other Work performed on or for the project that totals $50,000 dollars or more as classified and determined by the CLB.

A bidder should request clarification from the Design Professional (or from DBA Construction Section, if no Design Professional exists for the project), if the bidder determines a type of work (mechanical – indicative of HVACR; electrical; plumbing; roofing) is a component of the project, but space has not been provided on the bid form for the listing of such, if the bid form lists a type of Work that is not a component of the project or if the bidder has any question on how to fill out the proposal with respect to the listing of subcontractors. Clarification should be made in accordance with Instruction 3.2.

9.1.1 The Prime Contractor must make a decision as to which (mechanical –indicative of HVACR; electrical; plumbing; roofing) subcontractor or his own forces he intends to use for each principal discipline of work. The prime contractor shall place the name(s) of each subcontractor or his own forces he intends to perform the Work in the space provided on the Bid Form and indicate whether the amount of the listed Work is $50,000.00 or more. The prime contractor and/or the subcontractor listed on the bid form must be properly licensed by the Contractors Licensing Board (CLB) for any principal Work (mechanical –indicative of HVACR; electrical; plumbing; roofing), as well as any other proposed Work on the project.

If a Contractor or Subcontractor needs license classification guidance or wishes to verify classifications and/or licensees of subcontractors or their own forces they should contact the CLB prior to submitting the bid. If the bid form has a space for the prime contractor to list which subcontractor(s) or his own forces he intends to utilize to accomplish the disciplines of mechanical, electrical, plumbing, and/or roofing, the bidder must fill in the said blank space with the name of the contractor/subcontractor that will perform this work. Failure to complete the form correctly shall cause the bid to be declared non-responsive, and the bid will not receive consideration.

9.1.2 It shall be mandatory that any subcontractors listed on the Bid Form by the Prime Contractor are awarded a contract under Ark. Code Ann. § 22-9-204. Prime Contractors who submit a bid listing unlicensed subcontractors or use unlicensed subcontractors on a state project or any subcontractor not licensed by the Contractors Licensing Board who perform Work having a value of $50,000.00 or more on a state project are subject to the Contractors Licensing Board.

9.2 License Requirement

a. No person shall perform Work on the contract without possessing the applicable Arkansas State License for the Work they are performing from the appropriate governing Boards. Apprentices will be appropriately supervised according to the State governing Boards requirements.

b. All licensed craftsman shall have a copy of their license with them and shall be required to provide it to a DBA or Owner Representative upon request.

9.3 Pursuant to Ark. Code Ann. § 22-9-404, the Bidder may require subcontractors to provide a Performance and Payment Bond to the Bidder when the Subcontractor is the selected for their portion of the Work. If the Contractor requires a Subcontractor to furnish a Performance and Payment Bond, the Subcontractor shall be entitled to payment of ninety-five (95) percent of the earned progress payments when due, with the Contractor retaining five (5) percent to assure faithful performance of the construction subcontract. Upon the approval of the Contractor, if the Subcontractor completes fifty (50) percent of the construction subcontract the Contractor shall not retain any further monies.

10. **SUBMITTAL**. Submit bid on the Bid Form in an opaque, sealed envelope. Identify the envelope with: the words “Bid Documents”, project name and number, name of Bidder, and Arkansas Contractors License number, if required; only one bid shall be submitted per State Contractors license number. Submit bids in accordance with the Invitation to Bid. All blanks on the form shall be filled out in ink or be typewritten. Erroneous entries, alterations, and erasures shall be lined out, initialed by the Bidder, and the corrected entry inserted on the Bid Form.

11. **MODIFICATION, WITHDRAWAL AND SCRIVENERS’ ERROR**.

11.1 Modification and Withdrawal. Bidder may withdraw bid at any time before bid opening and may resubmit up to the date and time designated for receipt of bids. No bid may be withdrawn or modified after time has been called for the bid opening. Oral modifications to bids will not be considered. Bidder may submit written modifications to bid in writing, by telegraph, or by facsimile and must be received by DBA at any time prior to the expiration of the bidding time and date. All modifications shall be signed and no modification shall show the base bid amount. Telegraph or facsimile modifications shall require written confirmation over the Bidder's original signature within 24 hours after bid opening.

11.2 Scriveners’ Error. Pursuant to Ark. Code Ann. § 19-4-1405 (e), bidders may request in writing to the DBA Director, to be relieved of their bid any time after the bid opening, but no later than 72 hours after receiving the intent to award, excluding Saturdays, Sundays and holidays. Scriveners’ error is an error in the calculation of a bid which can be documented by clear and convincing written evidence and which can be clearly shown by objective evidence drawn from inspection of the original work papers, documents, or materials used in the preparation of the bid sought to be withdrawn; and the bid was submitted in good faith and the mistake was due to a calculation or clerical error, an inadvertent omission, or a typographical error as opposed to an error in judgment.

11.2.1 Failure to make a timely request constitutes a waiver by the bidder of the bidder's right to claim that the mistake in his or her bid was a scriveners' error.

12. **DISQUALIFICATION OF BIDDERS**. The State shall have the right to disqualify bids (before or after opening), which includes but is not limited to, evidence of collusion with intent to defraud or other illegal practices upon the part of the Bidder, to reject a bid not accompanied by the required bid security or by other data required by the Contract Documents, or to reject a Bid which is in any way incomplete or irregular.

13. **APPLICABLE LAWS**.

13.1 Labor. Contractors employed upon the work will be required to conform to the labor laws of the State of Arkansas and the various acts amendatory and supplementary thereto, and to all the laws, regulations, and legal requirements applicable thereto.

13.2 Discrimination. Bidder shall not discriminate against any employee, applicant for employment, or subcontractor as provided by law. Bidder shall be responsible for ensuring that all subcontractors comply with federal and state laws and regulations related to discrimination. Upon a final determination by a court or administrative body having proper jurisdiction that the Bidder has violated state or federal laws or regulations, the Owner or DBA, or both may impose a range for appropriate remedies up to and including termination of the Contract.

13.3 Taxes. Bidder shall include in the bid all state sales tax, social security taxes, state unemployment insurance, and all other items of like nature. It is the intent that the bid shall represent the total cost to the Owner of all work included in the contract. There are no provisions for a contractor to avoid taxes by using the tax exempt number of a state agency, board, commission or institutions. Said taxes shall be included in the bid price.

13.4 State licensing laws for Contractors shall be complied with.

13.5 Disclosure. Potential Bidders are hereby notified that any bidder who desires to enter into a contract not exempted from the disclosure requirements, that disclosure is a condition of the Contract and that the Owner cannot enter into any such contract, nor can DBA approve any such contract, for which disclosures are not made and the verbiage of paragraphs a, b, and c below will be included in the body of any contract awarded.

Potential Bidders are hereby notified that:

a. Disclosure is required to be a condition of any present or future subcontract for which the total consideration is greater than twenty-five thousand dollars ($25,000.00).

b. The Contractor shall require any present or future Subcontractor, for which the subcontract amount is greater than $25,000.00 to complete and sign the Contract and Grant Disclosure and Certification form. The Contractor shall ensure that any agreement, current or future between the Contractor and a Subcontractor for which the total consideration is greater than $25,000.00 shall contain the following:

Failure to make any disclosure required by Governor Executive Order 98-04, or any violation of any rule, regulation or adopted pursuant to that Order shall be material breach of the term of this subcontract. The party who fails to make the required disclosure or who violates the rule, regulation, or policy shall be subject to all legal remedies available to the contractor.

c. The Contractor shall transmit a copy of the Subcontractor's disclosure form to the agency and a statement containing the dollar amount of the subcontract within ten (10) days upon receipt of subcontractor's disclosure.

Note: A copy of the "Contract and Grant Disclosure and Certification Form" DBA 00 73 73 is included within the division zero documents.

13.5 Minority Participation: Pursuant to Ark. Code Ann. § 22-9-203, the State encourages all small, minority, and women business enterprises to submit bids for capital improvements. Encouragement is also made to all prime contractors that in the event they subcontract portions of their work, consideration is given to the identified groups.

13.6 The bidding, award and administration of the contract shall be made pursuant to Ark. Code Ann. §19-4-1401 et seq., Ark. Code Ann. § 22-9-101 et seq., Ark. Code Ann. § 22-2-101 et seq. and the Minimum Standards and Criteria. The interpretation and intent of these laws and rules take precedence in the event of any conflict with the bid or contract documents, or both. Clarification should be made in accordance with Instruction 3.2.

13.7 Pursuant to Ark. Code Ann. §19-11-105, no state agency may enter into or renew a public contract for services with a Contractor who knows that the Contractor or a Subcontractor employs or contracts with an illegal immigrant to perform work under the contract.

Before executing a public contract, each prospective contractor shall certify in a manner that does not violate federal law in existence on January 1, 2007, that the Contractor at the time of the certification does not employ or contract with an illegal immigrant. Online certification shall be made at: https://www.ark.org/dfa/immigrant/index.php/user/welcome

If a Contractor violates this section, the Owner shall require the Contractor to remedy the violation within sixty (60) days. Failure to remedy the violation within the sixty (60) days as required by law, the Owner shall terminate the contract for breach of the contract and the Contractor shall be liable to the Owner for actual damages.

If a Contractor uses a Subcontractor at the time of certification, the Subcontractor shall certify in a manner that does not violate federal law in existence on January 1, 2007, that the Subcontractor at that time of certification does not employ or contract with an illegal immigrant. Subcontractors shall submit the certification required to the Contractor within thirty (30) days after the execution of the subcontract. The Contractor shall maintain on file the certification of the Subcontractor throughout the duration of the term of the contract. If the Contractor learns that a Subcontractor is in violation of this section, the Contractor may terminate the contract with the Subcontractor, and the termination of the contract for a violation of this section shall not be considered a breach of the contract by the Contractor and Subcontractor. Contractor agrees the Owner's Representative or DBA shall have the right to request the Contractor's records of Subcontractors illegal immigrant disclosure statements during the course of the project.

13.8 Pursuant to Ark. Code Ann. §25-1-501 (Act 710 of 2017), state agencies shall not enter into contracts with companies for construction work unless the contract includes a written certification from the company or person that the company or person is not currently engaged in a boycott of Israel and agrees for the duration of the contract not to engage in a boycott of Israel.

Before executing a public contract, each prospective contractor shall certify by signing the "Anti-Boycott of Israel" certification. This certification shall be submitted as one of the contract documents. The Contract shall not be approved until the certification is completed and provided with the other bid documents necessary for contract approval. If a Contractor violates this section, the Owner shall require the Contractor to remedy the violation within thirty (30) days. Failure to remedy the violation, shall constitute a breach of the contract and the Contractor shall be liable to the Owner for actual damages.

Note: A copy of the "Anti-Boycott of Israel Certification" is included in section 00 45 00.

13.9 Pursuant to Ark. Code Ann. §22-9-105 (Act 422 of 2019) , contractors who have been determined by a State Agency to be on the "Prohibited Bidders List" may not bid on state projects. Bidders should review Section 3-324 of the Building Authority Minimum Standards and Criteria for more information. Contractors who are determined to be prohibited from bidding due to material issues on state contracts may not be awarded state capital improvement contracts until the state agency has determined the material issue is no longer of concern or the contract has been terminated or closed out, whichever is sooner. However, the contractor's ineligible bidding status shall not exceed more than three (3) years.

14. **LIQUIDATED DAMAGES**. The amount of liquidated damages to be assessed shall be in accordance with the amount indicated in the Contract. Bidder understands and agrees that under the terms of the Contract to be awarded, if the Contractor fails to complete the work within the time limit specified in the Contract, the Contractor shall pay the Owner as Liquidated Damages, and not in the nature of a penalty the sum specified in the Bid Form for each day completion is delayed. It is further understood and agreed by bidder that the said sum fixed as Liquidated Damages is a reasonable sum considering the damages that Owner will sustain in the event of any delay in completion of the Work, and said sum is herein agreed upon and fixed as Liquidated Damages because of difficulty in ascertaining the exact amount of damages that may be sustained by such delay.

15. **PREBID CONFERENCE**. See Section 00 11 16 – Invitation to Bid

16. **OPENING**. Bids will be opened as identified in the Invitation to Bid.

17. **EVALUATION AND CONSIDERATION OF BIDS.**

17.1 It is the intent of the State to award a Contract to the lowest responsive qualified Bidder provided the bid has been submitted in accordance with the requirements of the Contract Documents and does not exceed the funds certified for the project by more than 25%. The State shall have the right to waive any formalities in a bid received and to accept the bid which, in the State's judgment, is in its best interests and upon approval of DBA. The State shall have the right to accept any or all bids for a period not to exceed the time frame as stated in 6(d) of Section 00 41 13 Bid Form.

17.2 Tie Bids. If two or more sealed bids are equal in amount, meet Bidding Document requirements, and are the lowest received by the time of the bid opening, then the apparent low bidder will be determined by lot (placing the name of the tie bidders into a container and drawing one name). The drawing will be conducted by DBA personnel and another person so designated by DBA in the presence of a witness and the tie bidders or representatives. The witness shall be an employee of the State of Arkansas. Documentation of the drawing shall be included on the bid tabulation and be signed by those present. Nothing in the above and foregoing will diminish the State's reserved right to reject any and all bids and to waive any formalities.

18. **EXECUTION OF CONTRACT**.

18.1 The apparent low Bidder shall be prepared, if so required by the Owner, to present evidence of experience, qualifications, and financial ability to carry out the terms of the Contract.

18.2 The successful Bidder will be required to execute an Agreement with the Owner on a form identical to the Agreement Form included with the Contract Documents and the Performance and Payment Bond and Certification of Insurance and a copy of the policies showing all endorsement, exclusions within the time frame as stated in 6(b) of Section 00 41 13 Bid Form after receipt of the Intent to Award. Failure of the Bidder to do so may result in the Bidder being rejected and could result in disqualification and forfeiture of bid bond. The Owners notice to proceed shall not be issued until the insurance certificates and coverage have been reviewed and approved by the Owner. The successful Contractor will commence work within five (5) days of the start date listed on the notice proceed issued by the owner or DBA.

18.3 The successful Bidder will be required to furnish Owner with proof of insurance, as prescribed by the General Conditions and Supplementary General Conditions.

END OF DOCUMENT

BID FORM
Section 00 41 13 / Rev: August 2021

Bid Date:	Tuesday, August 8, 2023
Bid Time:	2:00 p.m.
Bid Opening Location:	Division of Building Authority, 501 Woodlane Street, Ouachitas Bid Room G-05, Little Rock, Arkansas 72201
Bid To:	Arkansas Department of Veterans Affairs
Bid From:	_____ _____
DBA Project Number:	3852301R
Project Name:	Arkansas State Veterans Cemetery - Birdeye Phase II

1) 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 within the time set forth, for the lump sum base bid of:

$ _____

Dollar Amount Is To Be Shown Numerically

2) Allowances:
Not Required

3) Unit Prices:
Required

If the required quantities of the items listed are increased or decreased by change order, the unit prices set forth shall apply to such quantities. Dollar amount is to be shown numerically. See Attachment A for Unit Prices.

4) Trench or Excavation Safety:
Required

Ark. Code Ann. §22-9-212 requires the contractor to indicate on this bid form the total cost of trench or excavation safety systems. FAILURE TO SHOW THE TOTAL COST WILL INVALIDATE THE BID. (see Section 00 73 19)

The total cost shall be included in the above base bid price.

$ _____

Dollar Amount Is To Be Shown Numerically

Please Note: Do not strike through or add language to the bid form. See Instruction to Bidders #6.1

5) Completion Date: The Bidder agrees that the work will be complete in accordance with the contract documents and ready for Substantial Completion:

Number of Calendar Days: 548
On or Before Date: N/A

6) 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 State reserves the right to reject any and all bids and to waive any formality.

b. 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 and proof of insurance within ten (10) days after receipt of the Intent to Award, will commence work within five (5) days after the start date of the Notice to Proceed, and will complete the Contract fully by Completion Date indicated. 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:
Dollar amount of liquidated damages per day: $500 until work is completed or accepted.

c. 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 and proof of insurance to the Owner within the time frame as stated in paragraph 6 (b) from receipt of the Intent to Award as these acts constitute a breach of the Contractor's duties.

d. That this bid may not be withdrawn for a period of: 90 calendar days after the bid opening.

e. 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.

f. The names of subcontractors and the nature of the work to be performed by each one have been included on the Bid Form.

g. The following prevailing wage rates will apply:
The undersigned agrees to pay all prevailing hourly wages prescribed and mandated by the Davis-Bacon Wage Rates and any other applicable federal regulations.

Please Note: Do not strike through or add language to the bid form. See Instruction to Bidders #6.1

h. Bids submitted by a “Joint Venture/Joint Adventure” shall be signed by representatives of each component part of the Joint Venture/Joint Adventure. The licenses of each component part of the Joint Adventure should also be listed in the bid submittal. Therefore, Joint Adventure bidders shall indicate at least two (2) signatures and should indicate 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.

7) The following document(s) is attached to and made a condition of this bid.

a. Bid Security

b. Attachment A Unit Prices

8) The undersigned acknowledges receipt of and inclusion as a part of the Contract Documents the following addenda(s):

#: _____	Dated: _____
#: _____	Dated: _____
#: _____	Dated: _____
#: _____	Dated: _____
#: _____	Dated: _____
#: _____	Dated: _____
#: _____	Dated: _____

Please Note: Do not strike through or add language to the bid form. See Instruction to Bidders #6.1

9) Listing of Mechanical, Plumbing, Electrical, and Roofing Subcontractors or the Prime Contractor if the portion of work will be performed with your own forces.

Important Please Note

Indicate the name(s) of each entity performing the listed work below and answer the follow-up question. All Mechanical, Plumbing, Electrical, and Roofing Subcontractors or your own forces if applicable shall be listed regardless of qualifications, licensures or work amount. Bidders should consult the project manual on how to fill out this form. Failure to name the subcontractor or prime contractor in the space provided shall cause the bid to be declared non-responsive and the bid will not receive consideration.

Mechanical: _____

Required

- Is the amount of Mechanical Work $50,000 or more? Yes _____ No _____
- Is the above listed subcontractor or prime contractor performing any other Work on the project? Yes _____ No _____ --- If yes, list the Work and the cost of all Work:

_____

Plumbing: _____

Not Required

_____

Electrical: _____

Required

- Is the amount of Electrical Work $50,000 or more? Yes _____ No _____ - Is the above listed subcontractor or prime contractor performing any other Work on the project? Yes _____ No _____ --- If yes, list the Work and the cost of all Work:

_____

Roofing: _____

Not Required

_____

Important Notice: If the Bid Form notes any or all of the above Subcontractor's (Mechanical (HVACR), Electrical, Plumbing, and/or Roofing) as "**Required"**, you must list a subcontractor or list your own forces as applicable or your bid will be declared non-responsive.

Bid Form Signature Page

Project Name: Arkansas State Veterans Cemetery - Birdeye Phase II **Project #: 3852301R**

Please Complete the Appropriate Section (Complete Only One)

☐ **Individual Entity of Company**

Legal Name of the Entity or Company | Contractors License Number

By: _____ _____

Signature of Authorized Officer of the Company | Date

Print Name | Email | Phone Number

Street Address | City | State | Zip Code

☐ **Corporation (Must Include with bid a copy of the authorized officer's authority to sign)**

By: _____

Signed With Legal Name of the Corporation | State of Incorporation | Contractor License Number

By: _____ _____

Signature of Authorized Officer of the Corporation | Date

Print Name | Email | Phone Number

Street Address | City | State | Zip Code

☐ **Joint Venture or Adventure**

1st Entity or Company (*legal Name*) | Contractors License Number

By: _____ _____

Signature of Authorized Officer of the Company | Date

Print Name | Email | Phone Number

Street Address | City | State | Zip Code

2nd Entity or Company (*legal Name*) | Contractors License Number

By: _____ _____

Signature of Authorized Officer of the Company | Date

Print Name | Email | Phone Number

Street Address | City | State | Zip Code

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Bid Bond
Section 00 43 13 / Rev: August 2021

KNOW ALL PERSONS BY THESE PRESENTS:

That we, _____, as Principal,

and, _____, as Surety, a

corporation duly organized under the laws of _____, and who is

qualified and authorized to do business in the State of Arkansas and is listed on the current

United States Department of the Treasury's listing of approved sureties, and held and firmly bound

unto Arkansas Department of Veterans Affairs, the State

of Arkansas and entities thereof as Obligee (owner/agency), in the sum of five (5) percent of the amount of the bid and for payment of which in lawful money of the United States, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH THAT, WHEREAS, Principal has submitted a Bid for the work on Division of Building Authority Project number/name: 3852301R Arkansas State Veterans Cemetery - Birdeye Phase II

NOW, THEREFORE, if Principal is not released from his bid as defined in the Bidding Documents and, if selected as the apparent lowest responsible Bidder, Principal shall, within the time period specified in the Bidding Documents, do the following:

(1) Enter into a written agreement in accordance with the Bid Document.

(2) File a performance and payment bond, which guarantees faithful performance and payment for labor and materials as required by the Bid Documents, in the County where the work is to be performed and provide said bond to the obligee.

(3) Furnish certificates of insurance and all other items as required by the Bidding Documents.

In the event of the disqualification of said Bid due to failure of Principal to enter into such agreement and furnish such bonds, certificates of insurance, and all other items as required by the bidding documents, Principal and Surety shall pay obligee the damage, loss, cost, and expenses subject to the amount of the bid security directly arising out of the Principal's default in failing to execute and deliver the contract and the performance/payment bond. Liability shall be limited to five (5) percent of the amount of the bid.

This bid bond is given in accordance with Arkansas laws and regulations, including Arkansas Code Ann. §19-4-1405, §22-9-203 and §22-9-402. This bid bond is binding upon the above named parties, and their successors, heirs, assigns and personal representatives. Executed by the parties who individually represent that each voluntarily enters into and has the authority to enter into this agreement.

IN WITNESS WHEREOF, we have hereunto set our hands this _____ day of _____, 20___.

Principal Company Name: _____

Contractor Name: _____

Signature*: _____

Title: _____

Surety Name: _____

Surety NAIC Number: _____

Resident/Non-Resident Agent Name: _____

Signature: _____

License Number*: _____

*** Bids shall be rejected if a proper bid bond/power of attorney is not submitted. Bid Bonds must be executed by a resident/non-resident agent licensed by the Arkansas Insurance Commissioner to represent the surety which have qualified and are authorized to do business in Arkansas and is listed on the current United States Department of the Treasury's listing of approved sureties. The Power of Attorney of the agent to act on behalf of the surety shall be submitted with this Bid Bond.**

Section 00 43 22 / Bid Form Attachment A Unit Prices					
Item/Spec	**Description**	**Quantity**	**Unit**	**Cost/Unit**	**Total for Item**
1	Crypt Underdrain Drainage Gravel (Clean, Washed)	1	CY		
2	#57 Drainage Stone (Clean Washed)	1	CY		
3	Earthwork	1	CY		
4	Onsite General Fill (Placed & Compacted)	1	CY		
5	Offsite General Fill (Placed & Compacted)	1	CY		
6	Export Material	1	CY		
7	Engineered Fill (Placed & Compacted)	1	CY		
8	Class 7 Base (Placed & Compacted)	1	TON		
9	Double Depth Concrete Crypts Installed (Concrete Vault Not in Contract, By	1	EA		
10	Oversized Double Depth Crypts Installed (Concrete Vault Not in Contract, by	1	EA		
11	Barrier Curb & Gutter	1	LF		
12	12x12 ADA Pavers	1	SF		
13	Asphalt Repair (seal cracks)	1	LF		
14	Concrete Sidewalks (Placed)	1	SY		
15	Nyloplast Catch Basin	1	EA		
16	Concrete Junction Box	1	EA		
17	Sump Pump	1	EA		
18	Crypt Perimeter Underdrain	1	LF		
19	Typical Underdrain Trench	1	LF		
20	Section K Underdrain	1	LF		
21	Cleanouts	1	EA		
22	3x3 Gabion Baskets (Fill with Rock)	1	EA		
23	3" Caliper Tree (Planted)	1	EA		
24	4" Caliper Tree (Planted)	1	EA		
25	6" Caliper Tree (Planted)	1	EA		

Section 00 43 22 / Bid Form Attachment A Unit Prices					
Item/Spec	**Description**	**Quantity**	**Unit**	**Cost/Unit**	**Total for Item**
26	Seed Mix (Planted)	1	SF		
27	Tubers (Planted)	1	EA		
28	Topsoil (Placed & Compacted)	1	CY		
29	Sod (Installed)	1	SY		
30	Tree Removal	1	EA		
31	Broadband Conduit	1	LF		
32	Electrical Conduit	1	LF		
33	Columbarium Column Repair	1	LS		
34	Sediment Removal from Existing RCP	1	LF		
35	Burial Section Control Markers	1	EA		
36	Surge Protector Device (SPD)	1	EA		
37	Fan at Committal Structure	1	EA		
38	Electrical Hand Holds	1	EA		

ISRAEL BOYCOTT RESTRICTION CERTIFICATION

Section 00 45 00 / Rev: August 2021

DBA Project Number: 3852301R

Project Name: Arkansas State Veterans Cemetery - Birdeye Phase II

Pursuant to Arkansas Code Annotated § 25-1-503, a public entity **shall not** enter into a contract valued at $1,000 or greater with a company unless the contract includes a written certification that the person or company is not currently engaged in and agrees for the duration of the contract not to engage in, a boycott of Israel.

By signing below, the Contractor agrees and certifies that they do not currently boycott Israel and will not boycott Israel during any time in which they are entering into, or while in contract, with any public entity as defined in § 25-1-503*. If at any time after signing this certification the contractor decides to engage in a boycott of Israel, the contractor must notify the contracting public entity in writing.

If a company does boycott Israel, see Arkansas Code Annotated § 25-1-503.

Arkansas Department of Veterans Affairs

Name of Public Entity

Print Name of Company

AASIS Vendor Number

Contractor Signature and Date

Print Name and Title

"Public entity" means the State of Arkansas, or a political subdivision of the state, including all boards, commissions, agencies, institutions, authorities, and bodies politic and corporate of the state, created by or in accordance with state law or rules, and does include colleges, universities, a statewide public employee retirement system, and institutions in Arkansas as well as units of local and municipal government.

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AGREEMENT FORM
Section 00 52 13 / Rev: August 2021

THIS AGREEMENT entered into this _____ by and between _____ hereinafter referred to as the Contractor, and Arkansas Department of Veterans Affairs hereinafter referred to as the Owner, and the Department of Transformation and Shared Services, Division of Building Authority (DBA),

WITNESSETH:

1) That for and in consideration of the payment by the Owner in the amount of $ - to be made as set forth in the Contract Documents, the Contractor hereby agrees to furnish all tools, labor, equipment, and materials, and to build and construct that certain project in Cross County, designated as

Project # : 3852301R

Project Name: Arkansas State Veterans Cemetery - Birdeye Phase II

consisting of construction, more specifically described in the Contract Documents attached hereto and incorporated herein by reference. Contract Documents include the following: the Agreement Form (this instrument); the Invitation to Bid; Instruction to Bidders; Bid Form; all Addenda; Performance and Payment Bond; General and Supplementary Conditions; Drawings and Specifications, Drawings listed in the Specifications; Notice to Proceed; Negotiated Changes Documents; and Change Orders. All capital improvements shall be in exact accord with the Contract Documents filed with the Construction Section Office, Division of Building Authority, located in Little Rock, Arkansas, on:

Tuesday, August 8, 2023

The Division of Building Authority (DBA) Construction Section shall have direct contract supervision. Said capital improvements shall be to the satisfaction of the DBA Construction Section, and in accordance with the laws of the State of Arkansas, and the work shall be subject to inspection and approval at all times by the appropriate state and federal agencies.

2) Owner may at any time during the progress of the work alter, change, subtract from, or add to said Contract Documents without violating this Agreement or the terms thereof. Said changes, alterations, subtractions, or additions shall be set forth in writing in a document referred to as a “Change Order”. Said document shall not be effective unless approved by the DBA. Once effective, the Change Order shall be attached hereto and incorporated herein by reference and shall be made a condition or term of the Contract Documents. Nothing contained in the Change Order shall be construed to waive the sovereign immunity of the State or entities thereof.

3) The Contractor agrees, for the consideration set forth in the Bid Form, to begin work within the time frame stated in 6 (b) of Section 00 41 13 Bid Form after a Notice to Proceed is issued and to complete the work:

In: 548 Calendar Days
On or Before: N/A

If the Contractor fails to complete the work within the time limit herein specified, he shall pay to the Owner, as liquidated damages and not in the nature of a penalty, the sum specified in the Bid Form of for each calendar day delayed, it being understood and agreed between the parties hereto that the said sum fixed as liquidated damages is a reasonable sum, considering the Owner will sustain in the event of any such delay, and said amount is herein agreed upon and fixed as liquidated damages because of difficulty of ascertaining the exact amount of damages that may be sustained by such delay. The said sum shall be deducted from the amount of the contract.

4) Should Contractor be delayed in the execution or completion of the Work by the act, neglect or default of the State, or by any damage by fire, weather conditions or other casualty or event for which the Contractor is not responsible, or by general strikes or lockouts caused by acts of employees, then any extended period shall be determined and fixed by the Owner with approval given by DBA Construction Section. Said extended period shall be the time for a period equivalent to the time lost by reason of any or all of the causes aforesaid, but no such allowance shall be made unless a claim therefore is presented in writing to the Owner or DBA Construction Section within seven calendar days of the occurrence of the event causing the delay.

5) It is mutually agreed between the parties that in the performance of this contract, Contractor is acting independently and in no sense as Agent of the State. Contractor shall not let, assign, or transfer this contract or any interest therein, without the written consent of the Owner and DBA.

6) It is agreed and understood between the parties hereto that the Contractor shall accept and the Owner will pay for the Work, at the prices stipulated in the Contract Documents, such payment to be in the form of legal tender, and the payment shall be made at the time and in the manner set forth in the Contract Documents.

7) Any laborer or mechanic employed by the Contractor or any Subcontractors for this project, directly on site for the Work covered by the Contract Documents, shall be paid a rate of wages required by the Contract Documents, if required. If the Owner or DBA, or both discovers that wages less than the rate of wages specified by the Contract Documents have been or are being paid, then the Owner or DBA, after giving written notice to the Contractor, will terminate the Contractor's right to proceed with the project Work or such part of the Work as to which there has been a failure to pay the required wages and to prosecute the Work to completion by contract or otherwise, and the Contractor and his sureties shall be liable to the Owner for any excess costs occasioned thereby.

8) Contractor shall promptly repair, at his own expense and to the satisfaction of the Owner and DBA Construction Section, damage done by him or his employees or agents at the work site, or to the public property or buildings, or both, and will save the State harmless from all claims of any person for injury to person or to property occasioned by his act, or the acts of his employees or agents, while in the execution of the work specified.

9) The Owner or DBA, or both may terminate this agreement to the extent Owner's funds are no longer available for expenditures under this agreement.

10) Failure to make any disclosure required by Governor's Executive order 98-04, or any violation of any rule, regulation, or policy adopted pursuant to that Order, shall be a material breach of terms of this contract. Any contractor, whether an individual or entity, who fails to make the required disclosure or who violates any rule, regulation, or policy shall be subject to all legal remedies available to the Agency.

a) The Contractor shall prior to entering any agreement with any subcontractor, for which the total consideration is greater than $25,000.00, require the subcontractor to complete a Contract and Grant Disclosure and Certification Form. The Contractor shall ensure that any agreement, current or future between the contractor and a subcontractor for which the total consideration is greater than $25,000.00 shall contain the following:
Failure to make any disclosure required by Governor Executive Order 98-04, or any violation of any rule, regulation or adopted pursuant to that Order, shall be a material breach of the term of this subcontract. The party who fails to make the required disclosure or who violates the rule, regulation, or policy shall be subject to all legal remedies available to the Contractor.

b) The Contractor shall, within ten days of entering into any agreement with a subcontractor, transmit to Division of Building Authority; a copy of the Contract and Grant Disclosure and Certification Form (00 73 73) completed and signed by the subcontractor and a statement containing the dollar amount of the subcontractor.

c) The terms and conditions regarding the failure to disclose and conditions which constitutes material breach of contract and rights of termination and remedies under the Executive Order 98-04 are hereby incorporated within.

11) Nothing in this Contract shall be construed to waive the sovereign immunity of the STATE OF ARKANSAS or any entities there of.

Executed by the parties who individually represent that each have the authority to enter into this Contract.

Project # : 3852301R

Project Name: Arkansas State Veterans Cemetery - Birdeye Phase II

Contractor: Legal Name of the Entity or Company

Signature of Authorized Officer of the Company | Date

Print Name | Title | Email Address

Street Address | City | State | Zip Code

Arkansas Department of Veterans Affairs
Owner: Agency Name

Signature of Authorized Officer of the Agency | Date

Print Name | Title | Email Address

501 Woodlane Drive, Suite 401N | Little Rock, Arkansas 72201
Street Address | City | State | Zip Code

Approved: Transformation & Shared Services, Division of Building Authority

By: _____ Date: _____

Title

PERFORMANCE AND PAYMENT BOND
Section 00 61 13 / Rev: August 2021

1) We _____, (Principal), and

_____, (Surety), are held and firmly bound, jointly

and severally, unto Arkansas Department of Veterans Affairs, as Obligee (Owner), in the initial Contract amount of $ - said amount to be deemed a Performance Bond payable to Owner and in the separate amount of $ - said amount to be deemed a Payment Bond payable to proper claimants such amounts subject to the terms of this Performance Bond and Payment Bond Agreement. The Principal and Surety state that the Surety is a solvent corporate surety company authorized to do business in the State of Arkansas and is listed on the current United States Department of Treasury's listing of approved sureties.

Principal has by written agreement dated _____ entered into a capital improvement contract (Contract) with the Owner for:
Arkansas State Veterans Cemetery - Birdeye Phase II
Project # 3852301R .The above referenced Contract is incorporated herein by reference.

2) Under this Performance Bond and Payment Bond Agreement, the Principal and Surety shall be responsible for the following:

a. Performance Bond

i. The Principal shall faithfully perform the above referenced Contract, which is incorporated herein by reference.

ii. In the event that the Principal defaults in its performance of its obligations under the Contract, the Principal and the Surety, jointly and severally, shall indemnify and save harmless the Owner from all cost and damage which the Owner may suffer by reason of Principal's failure to perform the Contract. Said indemnification shall include, but not be limited to, full reimbursement and repayment to the Owner for all outlays and expenses which the Owner may incur in making good any such default of the Contract by the Principal.

b. Payment Bond

i. Principal shall pay all persons all indebtedness for labor or material furnished or performed under the Contract and in doing so this obligation shall be null and void.

ii. In the event that Principal fails to pay for such indebtedness, 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.

3) This Performance Bond and Payment Bond is given in accordance with Arkansas laws and rules, including Ark. Code Ann. § 18-44-501 et seq., §19-4-1401 et seq., and § 22-9-401 et seq. The Surety guarantees that the Principal shall comply with Ark. Code Ann. § 22-9-301 et seq. by payment and full compliance with all prevailing hourly wage contract provisions where the contract amount exceeds the amount provided by law.

Any changes made in the terms of the Contract, including but not limited to, the amount of the Contract, or in the work to be performed pursuant to the Contract 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 and consent of the Surety or Sureties of any such change, extension or forbearance being are hereby voluntarily waived. In no event shall the aggregate liability of the Surety exceed the greater amount of the Contract, including DBA approved change orders.

This Performance Bond and Payment Bond Agreement is binding upon the above named parties, and their successors, heirs, assigns and personal representatives.

Executed by the parties who individually represent that each voluntarily enters into and has the authority to enter into this agreement.

By: _____

Contractor's (Principal) Signature Date

By: _____

Arkansas Resident Agent or Non-Resident Agent Signature (attach Power of Attorney) Date

_____ _____

Agent's License Number Surety Company's NAIC Number

_____

Print Agent's Name Date

_____

Street Address

_____

City County State Zip Code

_____

Business Phone Number Email Address

CERTIFICATE OF SUBSTANTIAL COMPLETION

Section 00 65 16 / Rev: August 2021

Project Name: Arkansas State Veterans Cemetery - Birdeye Phase II

DBA Project Number: 3852301R Owner/Agency: Arkansas Department of Veterans Affairs

DEFINITION OF DATE OF SUBSTANTIAL COMPLETION:

The Date of Substantial Completion of the Work, or designated portion thereof, is the date certified by the Design Professional and approved by the Owner and DBA when the Work is sufficiently complete, in accordance with the Contract Documents, so the Owner can occupy or utilize the Work or designated portion thereof for the use for which it is intended, as expressed in the Contract Documents. Check the appropriate box below to denote a full or partial substantial completion.

☐ **PARTIAL SUBSTANTIAL COMPLETION**

The partial substantial completion includes the following area(s):

The Work performed under this Contract has been reviewed and found to be substantially complete. The Date of Substantial Completion for the above portion(s) of the Project is hereby established as: _____, which is the date of commencement of applicable warranties required by the Contract Documents, and assumption by the Owner of responsibility for maintenance, security, heat, utilities, damage to the Work and insurance excepting as stated below.

☐ **FULL SUBSTANTIAL COMPLETION**

The Work performed under this Contract has been reviewed and found to be substantially complete. The Date of Substantial Completion for the Project is hereby established as: _____, which is the date of commencement of applicable warranties required by the Contract Documents, and assumption by the Owner of responsibility for maintenance, security, heat, utilities, damage to the Work and insurance excepting as stated below.

The responsibilities of the Owner and the Contractor shall be as follows: (Note - Owner's and Contractor's legal and insurance counsel should determine and review insurance requirements and coverage; Contractor shall secure consent of the Surety Company, if any.)

A list of punch list items to be completed or corrected, prepared by the Contractor and verified and amended by the Architect/Engineer is attached hereto. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. The date of commencement of warranties for items on the attached list will be the date of final completion and inspection/acceptance by the Architect/Engineer, Owner and DBA.

In the case of a full substantial completion the Owner and Contractor understand and agree that all items listed on the attached punch list must be completed within 30 calendar days from the date of substantial completion. Failure to complete the punch list items within the above referenced timeframe may result in notification to and request for action of the Surety Company's Performance and Payment Bond.

Certification of Design Professional:

Firm Name: Ecological Design Group, Inc.

Address: 120 South Izard Street
Little Rock, Arkansas 72201

Signature Title Date

Approval of Contractor:

Company Name: _____

Address: _____

_____

Signature Title Date

Approval of Owner-Agency:

Agency Name: Arkansas Department of Veterans Affairs

Address: 501 Woodlane Drive, Suite 401N
Little Rock, Arkansas 72201

Signature Title Date

Approval of Dept. of Transformation and Shared Services, Division of Building Authority:

Signature Title Date

Cc: Surety Company

Certificate of Final Completion – Capital Improvement Project

Section 00 65 19 / Rev: August 2021

DBA Project Number: 3852301R Project Name: Arkansas State Veterans Cemetery - Birdeye Phase II

We, the undersigned parties, state:

1) The date of final completion for the above referenced project is herein established as: _____

Pursuant to Arkansas Code Annotated §22-9-604, retainage shall be released within thirty (30) days of the final completion date. The establishment of the final completion date shall not be deemed to relieve the Contractor of its obligation contained in the contract documents including but not limited to providing all close out documents for final payment.

2) All known details of the project are resolved and there is no uncompleted work left, no Contractor claims or outstanding progress payment(s).

3) The project punch list items, excluding warranty work is complete.

4) The substantial completion certificate previously executed established the twelve (12) month warranty period for projects and a twenty four (24) month warranty for roofing projects, or both. Sixty (60) days prior to the warranty expiration the parties listed below shall conduct a final warranty inspection; this report will be delivered to the Contractor who will correct all defects identified in the Design Professionals or Owners follow-up inspection reports.

Contractor:

_____
Contractor Company/Corporation Name

_____
By: Contractor Authorized Representative

_____
Print Name Date

Design Professional:

Ecological Design Group, Inc.
Design Professional Firm Name

_____
By: Design Professional Authorized Representative

_____
Print Name Date

State Agency, Board & Commission:

Arkansas Department of Veterans Affairs
Owner/Agency Name

_____
By: Agency Authorized Representative

_____
Print Name Date

Division of Building Authority

_____
By: DBA Observer or Authorized Representative

_____
Print Name Date

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Release of Claims
Section 00 65 19.13 / Rev: August 2021

Comes the undersigned, who does hereby swear and affirm that:

1. My name is: _____, and

I am doing business as: _____

and my legal address is: _____

_____

2. Except as stated in Paragraph Four (4) below, pursuant to Contract # : 3852301R

which was executed on: _____, on the following project:
Arkansas State Veterans Cemetery - Birdeye Phase II

I have paid and have otherwise satisfied all obligations for all furnished materials and equipment, all work, labor and services performed, and for all known claims against the Contractor arising in any manner in connection with the performance of the above referenced contract for which the Owner might in any way be held responsible.

3. Except as stated in Paragraph Four (4) below, to the best of my knowledge, information and belief, the releases or waivers of Claims, attached hereto and incorporated herein, includes the above referenced contract, all subcontractors, all suppliers of materials and equipment, and all performers of work, labor or services who have or may have claims against the Owner arising in any manner out of the performance of the Contract.

4. The Exceptions are: (if none exists, then indicate "none". The Contractor shall furnish a written explanation to the Owner for each exception.)

_____

_____

_____ _____
Affiant's Signature Date

Verification

STATE OF ARKANSAS >
>
COUNTY OF: _____

Subscribed and Sworn To before me this _____ *day of* _____ *20*____

_____
Notary Public

My Commission Expires: _____.

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Consent of Surety
Section 00 65 19.19 / Rev: August 2021

Comes the undersigned, who does hereby swear and affirm that:

1. My name is _____ and I am an authorized

representative of _____ a surety company.

2. With regards to the Project Arkansas State Veterans Cemetery - Birdeye Phase II

DBA Project # 3852301R ; Contract Date _____

_____ Contractor, and the Project Owner

Arkansas Department of Veterans Affairs ; I hereby approve the final payment to the Contractor. I agree that the final payment to the Contractor shall not relieve the Surety Company of any of its obligation as set forth in the contract with the State of Arkansas and this Contractor.

_____ _____

AFFIANT SIGNATURE DATE

VERIFICATION

STATE OF ARKANSAS >

>

COUNTY OF: _____

Subscribed and Sworn To before me this _____ *day of* _____ *20*____

_____

Notary Public

My Commission Expires: _____.

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Division of Building Authority
General Conditions
Section 00 72 13 / Rev: August 2021

Table of Contents

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ARTICLE 1 -- GENERAL PROVISIONS

1.1 DEFINITIONS

1.1.1 Contract Documents: Contract Documents consist of Agreement; Invitation to Bid; Instruction to Bidders; the Bid Form; the Bid and the Performance and Payment Bonds; General and Supplementary Conditions; Specifications; Drawings; Addenda issued prior to execution of the Contract; Front End Documents; all DBA approved Change Orders; Wage Rate Determinations (if required); other documents listed or referred to in the Agreement; and modifications issued after execution of the Contract and signed by Contractor and Owner, and approved by DBA.

1.1.2 Contract: The Contract Documents form the Contract for construction. The Contract Documents will not be construed to create a contractual relationship between the Design Professional and Contractor, between the Owner and a Subcontractor, between the Owner and Design Professional, or between entities other than the Owner and Contractor; however, a contractual relationship does exist between the Contractor and the agency referred to as Owner, and DBA for approval purposes.

1.1.3 Work: Construction and services required by the Contract Documents whether completed or partially completed, include tools, labor, equipment, supplies, transportation, handling, and incidentals provided by the Contractor.

1.1.4 Project: The total capital improvement project described in the Contract Documents.

1.1.5 Drawings: Graphic and textual portions of the Contract Documents showing the design, location, and dimensions and size of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

1.1.6 Specifications: Written requirements for materials, equipment, systems, standards, and workmanship for the Work, and performance of related services.

1.1.7 Project Manual: Volume, which may include the bidding requirements, forms, contracting requirements, and the Specifications.

1.1.8 Owner: The person or entity identified as such in the Contract Agreement, referred to throughout the Contract Documents as singular in number. The term Owner means the Owner which is a party to this contract.

1.1.9 Contractor: The person or entity identified as such in the Contract Agreement, referred to throughout the Contract Documents as singular in number. The Contractor means the person or other entity entering into the contract with the Owner. The term Contractor means the Prime Contractor or the Prime Contractor-authorized representative.

1.1.10 Design Professional (Architect/Engineer/Consultant): The person or entity identified as such in the Agreement, lawfully licensed to practice architecture or engineering or another field of expertise and under contract to Owner to provide design service, advice, and consultation, referred to throughout the Contract Documents as if singular in number. The term Design Professional means the Architect/Engineer/ Consultant or the authorized representative.

1.1.11 Subcontractor: Any person, firm, or corporation with a direct contract with the Contractor who acts for or in behalf of the Contractor in executing a portion of the Work. The term Subcontractor is referred to as singular in number and means the Subcontractor or the Subcontractor-authorized representative.

1.1.12 Inspector: A duly authorized representative of the Owner, DBA and Design Professional, designated for detailed inspection and/or observations of materials, construction, workmanship, and methods of construction.

1.1.13 Sites: The particular location of that part of the project being considered.

1.1.14 State: The Owner or DBA, or both

1.1.15 Day(s): Unless specifically referred to as calendar days, “day(s)” refers to a period of time meaning “work” days.

1.2 INTENT

1.2.1 The intent of the Contract Documents is to set forth the standards of construction, the quality of materials and equipment, the guarantees that are to be met, and to include items necessary for proper execution and completion of the Work. The Contract Documents are complementary and what is required by one will be as binding as if required by all. Performance by the Contractor shall be required to the extent consistent with the Contract Documents and reasonably inferable as necessary to produce indicated results.

1.2.2 Organization of the Specifications into divisions, sections, and articles, and arrangement of Drawings will 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 which have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

1.3 **CAPITALIZATION**

1.3.1 Terms capitalized in the Contract Documents include those which are specifically defined, the titles to numbered sections and articles, identified references to paragraphs, and the titles of other published documents.

1.4 **INTERPRETATION**

1.4.1 Whenever in these Contract Documents the words "as ordered", "as directed", "as required", "as permitted", "as allowed", or words or phrases of like importance are used, it shall be understood that the order, direction, requirement, permission, or allowance of the Owner and Design Professional is intended.

1.4.2 Whenever in these Contract Documents the word "product" is used, it shall be understood that the materials, systems, and equipment will be included.

1.4.3 Whenever in these Contract Documents the word "provide" is used, it shall be understood that it means to "furnish and install".

1.4.4 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.

ARTICLE 2 -- OWNER

2.1 **LAND**

2.1.1 The Owner will provide the lands shown on the Drawings upon which the Work shall be performed. The Owner will provide a right-of-way for access to the project site.

2.1.2 The Owner will provide base lines for the location of the principle component parts of the Work with a suitable number of benchmarks adjacent to the Work.

2.2 **RIGHT OF ENTRY BY OWNER**

2.2.1 The Owner and his authorized representative will have the right to enter the property or location on which the Work shall be constructed. The Owner further reserves the right to construct or have his authorized agents construct such work as the Owner will desire, so long as these operations do not interfere with or delay the work being constructed under this Contract.

2.3 **OWNER'S RIGHT TO CARRY OUT THE WORK**

2.3.1 If the Contractor defaults or neglects to perform the Work in accordance with the Contract Documents, including the requirements with respect to the schedule of completion, and fails after ten days written notice from the Owner to correct the deficiencies, or fails to work diligently to correct the deficiencies. The Owner may deduct the cost thereof from the payment then or thereafter due the Contractor.

ARTICLE 3 -- CONTRACTOR

3.1 **GENERAL**

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

3.1.2 The Contractor shall furnish labor, materials, equipment, and transportation necessary for the proper execution of the work unless specifically noted otherwise. The Contractor shall do all the work shown on Drawings and described in Specifications and all incidental work considered necessary to complete the project in a substantial and acceptable manner, and to fully complete the work or improvement, ready for use, occupancy and operation by the Owner. Drawings and Specifications shall be interpreted by the Design Professional or the Owner if no Design Professional exists for the project.

3.1.3 The Contractor shall cooperate with the Owner, Design Professional, Inspectors, and with other contractors on the Project. Contractor shall allow inspectors acting in an official capacity, to have access to the project site.

3.1.4 The Contractor shall determine that the final and completed work on the project is in accordance with the Contract Documents. The failure of the Design Professional to find or correct errors or omissions in the use of materials or work methods during the progress of the work shall not relieve the Contractor from his responsibility to correct all the defects in the Work.

3.1.5 The Contractor shall assist in making final inspections and shall furnish such labor and equipment as may be required for the final tests of equipment, piping, and structures.

3.2 **REVIEW OF FIELD CONDITIONS**

3.2.1 Before ordering material or doing Work, the Contractor shall verify all measurements involved and shall be responsible for the correctness of same. No extra charge or compensation will be allowed on account of difference between actual dimensions and the measurements indicated on Drawings; differences which may be found shall be submitted to Design Professional for consideration before proceeding with the Work.

3.2.2 Drawings may show the location or existence of certain exposed and buried utilities as well as existing surface and subsurface structures. The Owner assumes no responsibility for failure to show any or all such utilities and structures on the Drawings or to show such in the exact location. It is mutually agreed such failure will not be considered sufficient basis for claims for extra work or for increasing the pay quantities in any manner unless the obstruction encountered necessitates substantial changes in the lines or grades or requires the building of a special structure.

3.3 REVIEW OF CONTRACT DOCUMENTS

3.3.1 The Contractor shall study and compare Drawings, Specifications, and other instructions as a Construction Professional, not as a Design Professional and shall report to the Design Professional at once any error, inconsistency, or omission discovered.

3.3.2 In the event of conflict among the Contract Documents, interpretations will be based on the following order of precedence, stated highest to lowest:

a. The Agreement
b. This Division Zero (0) shall control in the event of conflict between this Division Zero (0) and other Divisions.
c. Addenda to Drawings and Specifications with those of later date having precedence.
d. Drawings and Specifications

3.3.3 Since the Contract Documents are complementary, the Contractor shall take no advantage of any apparent error or omission in the Drawings and Specifications. The Owner or Design Professional shall furnish interpretations as deemed necessary for the fulfillment of the intent of the Drawings and Specifications.

3.3.4 Discrepancies found between the Drawings and Specifications and actual site conditions or any errors or omissions in the Drawings or Specifications shall be immediately reported to the Design Professional or in the case where a Design Professional is not on the Project, the Owner shall be notified, who shall address such error or omission in writing. Work done by the Contractor after discovery of such discrepancies, errors, or omissions shall be at the Contractor's risk and expense.

3.3.5 The Contractor shall keep on the work site a copy of the drawings and specifications and shall at all times give the Owner, Design Professional, and DBA access thereto. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both. In case of differences between the drawings and specifications the more stringent document will prevail.

3.4 REQUEST FOR SUPPLEMENTARY INFORMATION

3.4.1 The Contractor shall make timely requests of the Owner or Design Professional for additional information required for the planning and production of the Work. Such requests shall be submitted as required, but shall be filed in ample time to permit appropriate action to be taken by all parties involved so as to avoid delay. Contractor understands and agrees that it is Contractor's duty to determine the need for, and to request said additional information in writing from the Design Professional by such date as allows Design Professional to provide the information to the Contractor by a date that will not adversely affect Contractor's ability to complete the Work by the date specified in the Contract.

3.4.2 Additional instructions may be issued by the Design Professional during the progress of the Work to clarify the Drawings and Specifications or as may be necessary to explain or illustrate changes in the Work.

3.5 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

3.5.1 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. The Owner or their designated representative may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.

3.5.2 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.

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

3.5.4 The Contractor shall provide shop drawings and other submittals, settings, schedules, and other drawings as may be necessary for the prosecution of the Work in the shop and in the field as required by the Drawings, Specifications, or Design Professional instructions. The Contractor shall coordinate all such drawings, submittals etc. and review them for accuracy, completeness, and compliance with other contract requirements.

Any deviation from the contract documents shall be disclosed upon submission to the Owner/Design Professional. Approval shall not relieve the Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with the requirements of this contract. Any work done before receiving approval from the Owner/Design Professional will be at the Contractor's risk.

3.6 LABOR AND MATERIALS

3.6.1 Except as otherwise specifically stated in the Contract, the Contractor shall provide, but not be limited to, all materials, labor, tools, equipment, water, light, heating and cooling, power, transportation, superintendence, temporary construction of every nature, taxes legally collectible because of the Work, and all other services and facilities of every nature whatsoever necessary to complete the Work in accordance with the Contract Documents in an orderly and efficient manner. The sequence of construction operations shall follow the schedule of construction as approved by the Design Professional. The Work shall not be discontinued by the Contractor without approval of the Design Professional. Should prosecution of the Work be discontinued for any reason, the Contractor shall notify the Design Professional at least twenty-four hours in advance of resuming the Work.

3.6.2 All equipment, material, and articles furnished under this contract shall be new and of most suitable materials grade for the purpose intended, unless otherwise specifically provided in this contract. Materials and equipment furnished under this Contract will be subject to inspection by the Owner's authorized representative or by independent laboratories. Defective material, equipment, or workmanship may be rejected at any time before the acceptance of the Work even though the defective material, equipment, or workmanship may have been previously overlooked and estimated for payment. The Contractor shall replace defective equipment and material in accordance with the Contract Documents at no additional cost to the Owner.

3.6.3 The Contractor shall provide materials and supplies not subject to conditional sales agreements, or other agreement reserving unto the seller any right, title, or interest therein. All materials and supplies shall become the property of the Owner upon final acceptance of this Contract by the Owner.

3.6.4 If shop tests are to be conducted, the Contractor shall notify the Owner of such tests so a representative may witness tests, if desired.

3.6.5 The Contractor may make substitutions only with the consent of the Owner, after evaluation by the Design Professional, and in accordance with a Change Order.

3.7 UNAUTHORIZED WORK

3.7.1 Work done without lines and grades having been given or work done beyond the lines or not in conformity with the grades shown on the Drawings or as provided by the Owner, except as provided herein, and work completed without proper inspection and supervision or any extra or unclassified work completed without written authority and prior agreement shall be at the Contractor's risk. Such unauthorized work, at the option of the Design Professional, may not be measured and paid for and may be ordered removed at the Contractor's expense.

3.8 SUPERINTENDENCE

3.8.1 The Contractor shall supervise and direct the Work. The Contractor shall be solely responsible for construction means, methods, techniques, sequences, and procedures and for coordinating portions of the Work under the Contract.

3.8.2 The Contractor shall employ a qualified superintendent during the duration of the Project who is acceptable to the Owner, Design Professional and DBA Construction. The superintendent shall be maintained on the Project site and shall be present on the site at all times work is in progress. The superintendent shall be capable of reading and understanding the Drawings and Specifications and shall have full authority to act in behalf of the Contractor. All directions and instructions given to the Superintendent shall be considered as given to the Contractor and shall be as binding as if given to the Contractor.

3.8.3 Workmanship shall be performed by workmen experienced in their trade and skilled and experienced for the class of work to which assigned. Any person, including supervisory personnel, who does not show and exhibit skill and proficiency in said work shall be removed by the Contractor and replaced by a competent and experienced workman.

3.8.4 The Contractor shall, at all times, be responsible for the conduct and discipline of his employees and all Subcontractors and their employees. Disorderly, incompetent or intemperate persons, or persons who commit any crimes or trespass on public or private property in the vicinity of the Work must not be allowed to continue working upon the project which the Contractor has with the State. Any superintendent, foreman or workman employed by the Contractor or a Subcontractor who unreasonably refuses or neglects to comply with the instructions of the Owner, Design Professional, or Inspector, shall, at the written request of the Owner or Design Professional, be removed from the work site and shall not be allowed to work further on any portion of the work or another State Project without the approval of the Owner.

3.8.5 The Contractor shall coordinate Work by the various trades to provide uniform and symmetrical layout and spacing of the exposed components which will affect the finished design and appearance. Where spacing and related locations are not specifically shown on Drawings or where in doubt, the Contractor shall consult the Design Professional prior to installation of that part of the Work.

3.9 PERMITS, FEES, AND NOTICES

3.9.1 The Contractor shall purchase and secure all applicable permits and licenses and give all notices necessary and incidental to the prosecution of the Work. However, in accordance with Ark. Code Ann. §22-9-213, public works construction projects conducted by DBA or other state agencies are exempt from permit fees or inspection requirements of county or municipal ordinances.

3.9.2 When new construction under the Contract crosses highways, railroads, streets or utilities under the jurisdiction of the state, county, city, or other public agency, public utility, or private entity, the Contractor shall secure written permission from the proper authority before executing such new construction. A copy of this written permission shall be filed with the Owner before any work is completed. The Contractor shall furnish a release from the proper authority before final acceptance of the Work. Any bonds required for this Work shall be secured and paid for by the Contractor.

3.10 SAMPLES AND TESTS

3.10.1 The Contractor shall provide samples, materials, and equipment necessary or required for testing as outlined in the various sections of the Specifications or as directed by the Owner. The Contractor shall pay all costs for testing. Should materials, methods, or systems fail to meet specified standards, the Contractor shall pay all costs for additional testing as required by the Owner.

3.10.2 All tests shall be made by a laboratory approved by the Owner.

3.11 LOCATION, GRADIENT, AND ALIGNMENT

3.11.1 Based upon the site information provided by the Owner and verified by the Contractor, the Contractor shall develop and make detailed surveys necessary for construction including slope stakes, batter boards, and other working points, lines and elevations. The Contractor shall verify the figures before laying out the work and will be held responsible for any error resulting from its failure to do so.

3.11.2 The Contractor shall report any errors, inconsistencies, or omissions to the Design Professional as a request for information.

3.11.3 The Contractor shall preserve benchmarks, reference points and stakes, and in the case of destruction thereof by the Contractor, shall be responsible for damage or mistakes resulting from unnecessary loss or disturbance.

3.12 LAND

3.12.1 Additional land and access thereto not shown on Drawings that may be required for temporary construction facilities or for storage of materials shall be provided by the Contractor at his expense with no liability to the Owner. The Contractor shall confine his equipment and storage of materials and the operation of his workmen to those areas shown on the Drawings and described in the Specifications, and such additional areas which he may provide or secure as approved by the Owner.

3.12.2 The Contractor shall not enter upon private property for any purpose without first obtaining permission.

3.12.3 The Contractor shall be responsible for the preservation of and prevent damage or injury to all trees, monuments, and other public property along and adjacent to the street and right-of-way. The Contractor shall prevent damage to pipes, conduits and other underground structures, and shall protect from disturbance or damage all monuments and property marks until an authorized agent has witnessed or otherwise referenced their location, and shall not remove monuments or property marks until directed.

3.13 LIMITS OF WORK

3.13.1 The Contractor shall conduct Work and operations so as to cause a minimum of inconvenience to the public. At any time when, in the opinion of the Owner or Design Professional, the Contractor is obstructing a larger portion of a road, street, or other public right-of-way than is necessary for the proper execution of the Work, the Design Professional may require the Contractor to finish the sections on which work is in progress before work is commenced on any new sections.

3.14 WARRANTY

3.14.1 In addition to any other warranties in this contract, the Contractor warrants that Work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, or workmanship performed by the Contractor or any Subcontractor or supplier. The Contractor shall warrant that all Work, materials, and equipment furnished will be free from defects in design, materials, and workmanship and will give successful service under the conditions required.

The warranty period for Work, materials, and equipment furnished by the Contractor shall be one year from the date of the written acceptance of the Work as stated in the Substantial Completion Form approved by the Contractor, Owner, Design Professional and DBA or the date that the DBA approves the final payment request, unless a longer period is agreed upon.

3.14.2 Warranty of Title: The Contractor warrants good title to all materials, supplies, and equipment incorporated in the Work and agrees to deliver the premises together with all improvements thereon free from any claims, liens or charges, and agrees further that neither it nor any other person, firm or corporation shall have any right to a lien upon the premises or anything appurtenant thereto.

3.15 PATENTS AND ROYALTIES

3.15.1 If the Contractor is required or desires to use any design, device, material or process covered by letters, patent, or copyright, he shall provide for such use by suitable legal agreement with the patents or Owner. It is mutually understood and agreed that without exception the Contract Sum shall include all royalties or costs arising from patents, trademarks, and copyrights in any way involved in the Work.

The Contractor and the surety shall defend, indemnify, and save harmless the Owner and all its officers, agents and employees from all suits, actions, or claims of any character, name and description brought for or on account of infringement or alleged infringement by reason of the use of any such patented design, device, material or process of any trademark or copyright used in connection with the Work agreed to be performed under this Contract, and shall indemnify the Owner for any cost, expense, or damage which it may be obliged to pay by reason of any action or actions, suit or suits which may be commenced against the Owner for any such infringement or alleged infringement at any time during the prosecution of the Work contracted for herein.

It is mutually agreed that the Owner may give written notice of any such suit to the Contractor, and thereafter, the Contractor shall attend to the defense of the same and save and keep harmless the Owner from all expense, counsel fees, cost liabilities, disbursements, recoveries, judgments, and executions in any manner growing out of, pertaining to, or connected therewith.

3.16 CLEANING UP

3.16.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove from and about the Project waste materials, rubbish, the Contractor’s tools, construction equipment, machinery, and surplus materials, not purchased for or by the Owner.

3.16.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost thereof shall be charged to the Contractor.

ARTICLE 4 -- ADMINISTRATION OF CONTRACT

4.1 DESIGN PROFESSIONAL AUTHORITY

4.1.1 The Design Professional will interpret the requirements of the Contract Documents and decide matters concerning performance there under on request of the Owner or Contractor.

4.1.2 The Design Professional will provide administration of the Contract as described in the Contract Documents and will be the Owner's representative. The Design Professional will decide any and all questions as to the acceptability of materials or equipment furnished, work performed, interpretation of the Drawings and Specifications, rate of progress of the Work, acceptability of the quality of workmanship provided, and other questions as to the fulfillment of the Contract by the Contractor.

4.1.3 The Design Professional will prepare all change orders on the form specified by DBA. The Design Professional may authorize minor changes in the Work not involving adjustment in Contract Sum or extension of Contract Time and not inconsistent with the intent of the Contract Documents.

4.1.4 The Design Professional and his authorized representatives, Owner and DBA will have the right to enter the property or location on which the Work shall be constructed.

4.2 CLAIMS

4.2.1 Definition: A claim is a demand or assertion by one of the parties seeking adjustment, or interpretation of Contract terms, payment of money, extension of time, or other relief with respect to the terms of the Contract. The term includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. Claims will be initiated by written notice. The responsibility to substantiate claims shall rest with the party making the claim.

4.2.2 Claims of the Contractor or the Owner: Claims regarding the Work of the Contract shall be referred initially to the Design Professional for a decision. The Design Professional will review claims, and 1) reject in whole or in part; 2) approve the claim; 3) suggest a compromise; 4) advise the parties that the Design Professional is unable to resolve the claim.

4.2.3 Claims for Concealed or Unknown Conditions: If new and unforeseen items of work are discovered, which cannot be covered by any item or combination of items for which there is a Contract Sum, then the Contractor shall notify the Design Professional as quickly as reasonably possible and shall not continue working on the discovered new or unforeseen items without express written permission from the Design Professional. The Contractor shall complete such work and furnish such materials as may be required for the proper completion or construction of the work contemplated upon written Change Order from the Design Professional as approved by the Owner and DBA. Work shall be performed in accordance with the Contract Documents.

4.2.4 Claims for Extensions of Time: The Contractor shall provide written notice to Design Professional within seven calendar days stating the cause of the delay and request an extension of Contract Time. The Design Professional will act on the request in writing. The extension of time shall be for a period equivalent to the time lost by reasons indicated. No extension of time shall be effective until included in a Change Order approved by the Owner, Design Professional and DBA.

4.2.5 Claims for Changes in the Work: The Contractor shall provide written notice to Design Professional within seven calendar days after the receipt of instructions from the Owner, as approved by the Design Professional and DBA to proceed with changes in the Work and before such Work is commenced. Changes in the Work shall not be commenced before the claim for payment has been approved, except in emergencies endangering life or property. The Contractor's itemized estimate sheets showing labor and material shall be submitted to the Design Professional. The Owner's order (Change Order) for changes in the Work shall specify any extension of the Contract Time and one of the following methods of payment:

a. Unit prices or combinations of unit prices, which formed the basis of the original Contract.

b. A lump sum fee based on the Contractor's estimate, approved by the Design Professional and accepted by the Owner.

c. The applicable methods of computation as set forth in 7.2.2.3.

4.2.6 Claims for Additional Costs: In case of an emergency which threatens loss or injury of property or safety of life, the Contractor shall be allowed to act, without previous instructions from the Design Professional, in a diligent manner. The Contractor shall notify the Design Professional immediately thereafter. Any claim for compensation by the Contractor due to such extra work shall be promptly submitted, but in no case more than 7 calendar days following the event causing the emergency, to the Design Professional for consideration.

The amount of reimbursement claimed by the Contractor on account of any emergency action shall be determined in the manner provided under these General Conditions. No agreement to pay costs for additional work shall be effective until included in a Change Order approved by the Owner, Contractor, the Design Professional and DBA.

ARTICLE 5 -- SUBCONTRACTORS

5.1 ASSIGNMENT OF CONTRACT

5.1.1 Neither the Owner nor the Contractor shall have the right to sublet, sell, transfer, assign, or otherwise dispose of the “Contract” or any portion thereof without written consent of the other party. No assignment, transfer, or subletting, even with the proper consent, shall relieve the Contractor of his liabilities under this Contract. Should any Assignee or Subcontractor fail to perform the work undertaken by him in a satisfactory manner, the Owner, with DBA approval, has the right to annul and terminate the Assignee's or Subcontractor's contract on the project.

5.2 SUBCONTRACTS

5.2.1 The subcontracting of the whole or any part of the Work to be done under this Contract will not relieve the Contractor of his responsibility and obligations. All transactions of the Owner or Design Professional shall be with the Contractor. Subcontractors will be considered only in the capacity of employees or workmen and shall be subject to the same requirements as to character and competency.

5.2.2 The Contractor shall discharge or otherwise remove from the project any Subcontractor that the Owner or the Design Professional has reasonably determined as incompetent or unfit.

5.2.3 The Contractor may not change those Subcontractors listed on the proposal without the written approval of the Owner, Design Professional and DBA. The Contractor shall submit written evidence, which includes but is not limited to, that the substituted contractor is costing the same amount of money or less and if costing less, that the saving will be deducted from the total contract of the prime contractor and rebated to the Owner prior to any approval. The Contractor shall submit his request to the Design Professional who then shall review the request, if approved, the request and approval shall be forwarded to the Owner. The Owner shall then review the request and accompanying paperwork and if approved, shall forward the approval and the accompanying documents to DBA. DBA shall review all of the documents.

DBA shall provide written notification to the Contractor, Design Professional and Owner as its determination. The Contractor shall not be relieved of any liabilities under this Contract, but shall be fully responsible for any Subcontractor or work by said Subcontractor where Subcontractor is employed by the Contractor to perform work under this Contract. Nothing contained in the Contract Documents shall create contractual relations between any Subcontractor and the State.

5.2.4 No officer, agent, or employee of the Owner, including the Design Professional, shall have any power or authority to bind the Owner or incur any obligation in his behalf to any Subcontractor, material supplier or other person in any manner whatsoever.

ARTICLE 6 - CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

6.1 OTHER CONTRACTS

6.1.1 The Owner reserves the right to award other contracts in connection with the Project. The Contractor shall cooperate with the other contractors with regard to the storage of materials and equipment, access to the site, and execution of their work. It shall be the Contractor's responsibility to inspect the work of other contractors which will affect the work of this Contract and to report to the Owner irregularities which will not permit him to complete his work in a satisfactory manner or in the time allotted. Failure to so report shall constitute an acceptance of the work of other contractors.

6.2 DEPENDENCE ON OTHERS

6.2.1 If any part of the Contractor's work depends for proper execution or results upon the work of the Owner or any separate contractor, the Contractor shall, prior to proceeding with the work, promptly report to the Design Professional any apparent discrepancies or defects in such other work that render it unsuitable for such proper execution and results. Failure of the Contractor to so report shall constitute an acceptance of the work.

ARTICLE 7 -- CHANGES IN THE WORK

7.1 GENERAL

7.1.1 The Owner may, as the need arises, without invalidating the Contract, order changes in the work in the form of additions, deletions, or modifications. Compensation to the Contractor for additional work or to the Owner for deductions in the work and adjustments for the time of completion shall be adjusted at the time of ordering such change.

7.1.2 Additional work shall be done as ordered in writing by the Owner. The order shall state the location, character, and amount of extra work. All such work shall be executed under the conditions of the Contract, subject to the same inspections and tests.

7.1.3 The Design Professional and the Owner reserve and shall have the right to make changes in the Contract Documents and the character or quantity of the work as may be considered necessary or desirable to complete fully and acceptably the proposed construction in a satisfactory manner.

7.2 CHANGE ORDERS

7.2.1 A Change Order is a written instrument, prepared by the Design Professional/DBA and approved by the Design Professional, the Contractor, the Owner, and DBA, stating their agreement upon the following, separately or in any combination thereof:

a. Description and details of the work.

b. Amount of the adjustment in the Contract Sum.

c. Extent of the adjustment in the Contract Time.

d. Terms and conditions of the Contract Documents.

7.2.2 Change Order requests by the Contractor shall be submitted in a complete itemized breakdown, acceptable to the Owner, Design Professional and DBA. Nothing contained in the change order shall be construed to waive the sovereign immunity of the State or entities thereof.

7.2.2.1 Where unit prices are stated in the Contract, Contractor should submit an itemized breakdown showing each unit price and quantities of any changes in the Contract Amount. The value of all such additions and deductions shall then be computed as set forth in Paragraph 7.2.2.3.

7.2.2.2 The Contractor shall present an itemized accounting together with appropriate supporting data for the purposes of considering additions or deductions to the Contract Amount. Supporting data shall include but is not limited to the following:

a. Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and worker or workmen's compensation insurance;

b. Cost of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

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

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

e. Additional costs of supervision and field office personnel directly attributable to the change. (General Conditions)

The burden of proof of cost rests upon the Contractor. Contractor agrees that DBA or Owner's Representative shall have the right, at reasonable times, to inspect and audit the books and records of Contractor to verify the propriety and granting of such cost.

7.2.2.3 Compute requests for changes be they additions or deductions as follows:

a. For work performed by the Contractor which results in an overall increase in the contract sum: example

Net Cost of Materials	a. _____
State Sales Tax	b. _____
Net Placing Cost including Owner approved General Conditions	c. _____
W.C. Insurance Premium and FICA Tax	d. _____
Subtotal of a+b+c+d:	_____
Overhead and Profit, shall not exceed 12% x (a+b+c+d)	e. _____
Allowable Bond Premium	f . _____
TOTAL COST	
a+b+c+d+e+f :	_____

b. The amount of credit to be allowed by the Contractor to the Owner for a deletion or change which results in a net decrease in the contract sum shall be actual net cost as computed as outlined in 7.2.2.3.a (a. through e.) and confirmed by the Design Professional. Credit for work deleted shall be computed as outlined in 7.2.2.3.a (a. through e.), except the Contractor's share of overhead and profit percentage is not less than seven (7) percent.

c. For added work performed by Subcontractors: Subcontractors shall compute their work as outlined in 7.2.2.3.a (a. through e.) to the cost of that portion of the work (Change) that is performed by the Subcontractor. The Contractor overhead and profit change shall not exceed five (5) percent plus the allowable bond premium.

d. The amount of credit to be allowed by the Contractor to the Owner for a deletion or change which results in a net decrease in the contract sum by a Subcontractor shall be actual net cost as computed as outlined in 7.2.2.3.a (a. through e.) and confirmed by the Design Professional for work deleted by a Subcontractor: Subcontractors shall compute their work as outlined in 7.2.2.3.a (a. through e.), except that the overhead and profit shall be not less than seven (7) percent and the Contractor's overhead and profit shall be not less than five (5) percent.

7.3 PAYMENT FOR CHANGES IN THE WORK

7.3.1 All changes in the Work will be paid for in the manner indicated in Article 4, Paragraph 4.2, and the compensation thus provided shall be accepted by the Contractor as payment in full for the use of small tools, superintendent's services, premium on bond, and all other overhead expenses incurred in the prosecution of such work.

7.3.2 The Owner shall not be deemed to have agreed to any costs for additional work, to have agreed to additional time for completion, or to have agreed to any other change in the terms and conditions of the Contract Documents until Owner, Design Professional and Contractor have executed a Change Order to this Contract, and the Change Order is approved by DBA.

ARTICLE 8 -- TIME

8.1 DEFINITIONS

8.1.1 Contract Time is the period of time identified in the Contract Documents for Substantial Completion of the Work, including authorized adjustments made as part of Change Orders agreed to by the Owner, Contractor, Design Professional and DBA.

8.1.2 Date for commencement of the Work is the fifth calendar day following the start date listed on the Notice to Proceed, unless otherwise stated in the Contract.

8.1.3 Date of Substantial Completion is the date certified by the Design Professional, the Owner and DBA.

8.2 PROGRESS

8.2.1 Time limits identified in the Contract Documents are of the essence of the Contract. The Contractor confirms that the Contract Time is a reasonable period of time for performing the Work.

8.3 HOLIDAYS

8.3.1 New Year's Day, Robert E. Lee/Dr. Martin Luther King's Birthday, President's Birthday, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day and the day thereafter, Christmas Eve and Christmas Day will be considered as being legal holidays; no other days will be considered unless declared by the Governor of the State of Arkansas through an Executive Order or Proclamation. No Design Professional clarifications, observations, or State inspections will be provided on legal holidays, Saturdays and Sundays, and no work shall be performed on these days except in an emergency or with written approval in advance by the Design Professional and Owner.

8.4 DELAYS

8.4.1 Delays beyond the Contractor's control occasioned by an act or omission on the part of the Owner, strikes, fires, additions to the Work, delays by any separate contractor employed by the Owner, extremely abnormal weather conditions, or other delays beyond the Contractor's control may, if agreed to by Change Order by the Contractor, Owner, Design Professional and DBA entitle the Contractor to an extension of time in which to complete the Work. While such delays may be just cause for an extension of the Contract Time, the Contractor shall not have a claim for damages for any such cause or delay.

ARTICLE 9 -- PAYMENTS AND COMPLETION

9.1 CONTRACT SUM

9.1.1 The Contractor shall accept the compensation, as herein provided, in full payment for furnishing all materials, equipment, labor, tools, and incidentals necessary to complete the Work and for performing all Work contemplated and embraced under the Contract. Also, for loss or damage arising from the nature of the Work, from the action of the elements or from any unforeseen difficulties which may be encountered during the prosecution of the Work until the final acceptance by the Design Professional and Owner; and for all risks of every description connected with the prosecution of the Work; for all expenses incurred in consequence of the suspension or discontinuance of the Work as specified; and for any infringement of patent, trademark, or copyright, and for completing the Work according to the Contract Documents. Neither the payment of any estimate nor of any retained percentage shall relieve the Contractor of any obligation to make good any defective work or material.

9.1.2 No moneys payable under Contract or any part thereof, except the estimate for the first month or period, shall become due and payable if the Owner so elects until the Contractor shall satisfy the said Owner that he has fully settled or paid for all materials and equipment used in or on the Work and labor done in connection therewith, and the Owner, if he so elects, may pay any or all such bills wholly or in part and deduct the amount or amounts so paid from any monthly or final estimate excepting the first estimate.

9.1.3 In the event the surety on any contract or payment bond given by the Contractor becomes insolvent, or is placed in the hands of a receiver, or has the right to do business in a state revoked as provided by law, the Owner may at its election withhold payment of any estimate filed or approved by the Design Professional until the Contractor shall give a good and sufficient bond in lieu of the bond so executed by such surety. Any and all subsequent bonds shall be filed with the Circuit Clerk of the County in which the Work is being performed.

9.2 SCHEDULE OF VALUES

9.2.1 The Contractor shall submit to the Design Professional a schedule of values for each part of the Work. The schedule shall be a complete breakdown of labor and materials for the various parts of the Work including an allowance for profit and overhead. The total of these amounts shall equal the Contract Sum. The approved schedule of values shall be used as a basis for the monthly payments to the Contractor. In applying for the monthly payment, the Contractor shall show a detailed account of work accomplished in conformity with the schedule.

9.3 MEASUREMENT OF QUANTITIES

9.3.1 The Contractor shall be paid for all Work performed under the Contract based on Design Professional computations of as-built quantities and the Contractor's Contract Sum. This payment shall be full compensation for furnishing all supplies, materials, tools, equipment, transportation, and labor required to do the Work; for all loss or damage, because of the nature of the Work, from the action of the elements or from any unforeseen obstruction or difficulty which may be encountered in the prosecution of the Work and for which payment is not specifically provided for all or any part of the Work; and for well and faithfully completing the Work in accordance with the Contract Documents. The method of computation and payment for each item shall be as set forth in the Specifications or the Supplementary Conditions.

9.4 REQUESTS FOR PAYMENT

9.4.1 The Contractor may submit periodically, but not more often than once each month, a Request for Payment for work completed. When unit prices are specified in the Contract Documents, the Request for Payment shall be based on the quantities completed.

9.4.2 Unless otherwise provided in the Contract Documents, payments will be made on account of materials or equipment not incorporated in the Work to date but delivered and suitably stored at the site, and if approved in advance by the Owner, payments may similarly be made for materials or equipment suitably stored at some other location agreed upon in writing. Payments for materials or equipment stored on or off the site shall be conditioned upon submission by the Contractor of bills of sale or such other procedures satisfactory to the Owner and the Design Professional to establish the Owner's title to such materials or equipment or otherwise protect the Owner's interest including applicable insurance and transportation to the site for those materials and equipment stored off the site.

9.4.3 The Contractor shall furnish the Design Professional all reasonable facilities and job tickets required for obtaining the necessary information relative to the progress and execution of the Work and the measurement of quantities. Each Request for Payment shall be computed from the Work completed on all items listed in the approved schedule of values less five (5) percent (retainage) of the adjusted Contract Sum and less previous payments to the Contractor on the Contract. Retainage may be waived pursuant to the process and procedures as stated in 9.5.2.

9.5 PERIODIC ESTIMATES FOR PAYMENT

9.5.1 Unless otherwise stated in the Specifications or Supplementary Conditions, the Owner shall cause the Design Professional to prepare an Estimate for Payment to the Contractor each month. The Design Professional will make the estimate for the materials complete in place and the amount of work performed in accordance with the Contract between the twenty-fifth day of the month and the fifth day of the succeeding month.

9.5.2 From the total of the amount estimated to be paid, an amount equal to five (5) percent of the total completed shall be retained from each payment request. The Owner may waive withholding retainage of the progress payments if both of the Design Professional and Owner agree the Work is fifty (50) percent complete and the Contractor has provided the Work in a satisfactory manner. Nothing in the proceeding sentence shall be construed as prohibiting the Owner from maintaining the withholding of retainage (5%) throughout the entire project. All sums withheld by the Owner and requested in a Final Pay Request prepared by the Owner or Contractor will be paid to the Contractor within 30 days after the Contract has been completed and the work approved by DBA. No retainage will be withheld on that amount of the progress payment pertaining to the cost of materials stored at the site or within a bonded warehouse.

9.6 PAYMENT FOR INCREASED OR DECREASED QUANTITIES

9.6.1 When alterations in the quantities of work not requiring Contract modifications are ordered and performed, the Contractor shall accept payment in full at the Contract Sum, for the actual quantities of work accomplished. No allowance will be made for anticipated profits. Increased or decreased work involving Contract modifications shall be paid for as stipulated in such Contract modifications.

9.7 DESIGN PROFESSIONAL'S ACTION ON A REQUEST FOR PAYMENT (See also 9.9)

9.7.1 The Owner shall cause the Design Professional to, within five working days plus time required for transmittal from one party to another, act on a Request for Payment by the Contractor in one of the following:

a. Approve the Request for Payment as submitted by the Contractor, and transmit same to the Owner.

b. Approve an adjusted amount, as the Design Professional will decide is due the Contractor informing the Contractor in writing of the reason for the adjusted amount, and transmit same to the Owner.

c. Withhold the Request for Payment submitted by the Contractor informing the Contractor, Owner and DBA in writing of the reason for withholding the request.

9.8 ACTION ON A REQUEST FOR PAYMENT AND FINAL PAYMENT

(See also 9.9)

9.8.1 The Owner will, within five working days plus transmittal time between the various state agencies involved, act on a Request for Payment (not Final) after approval by the Design Professional by one of the following:

a. Approve the Request for Payment as approved by the Design Professional and process the payment.

b. Approve payment of an adjusted amount as the Owner will decide is due the Contractor, informing the Contractor and the Design Professional in writing of the reason for the adjusted amount of payment.

c. Withhold the Request for Payment informing the Contractor and the Design Professional in writing of the reason for withholding the payment.

9.8.2 The State shall process payments in accordance with Ark. Code Ann. §19-4-1411, which establishes the time limits for the Design Professional, the Owner, and the Department of Finance and Administration. It also authorizes the Chief Fiscal Officer of the State to investigate any complaints of late payments and assess penalties for late payment. Complaints shall be addresses to: Chief Fiscal Officer of the State: Department of Finance and Administration; 1509 West Seventh Street, Suite 401; Post Office Box 3278; Little Rock, AR 72203-3278.

9.8.3 The Design Professional or the State may withhold payment for contested issues, including but not limited to, defective work on the project; evidence indicating the probable filing of claims by other parties against the Contractor related to the project; damage caused to another contractor; reasonable evidence that Work cannot be completed for the unpaid balance of the Contract Sum or within Contract Time or failure of the Contractor to make payments on materials, equipment or labor to subcontractors. It is the responsibility of the contesting party to notify the Contractor in writing that payment has been contested and the reasons why. The notification must be done within the timeframe specified for processing of payment under Ark. Code Ann. §19-4-1411.

9.9 PAYMENT FOR UNCORRECTED WORK

9.9.1 Should the Design Professional direct the Contractor not to correct work that has been damaged or that was not performed in accordance with the Contract Documents, an equitable deduction from the Contract Sum shall be made to compensate the Owner for the uncorrected work. The Design Professional shall determine the amount of the equitable deduction.

9.10 PAYMENT FOR REJECTED MATERIALS AND WORK

9.10.1 The removal of rejected Work and materials and the re-execution of acceptable work by the Contractor shall be at the expense of the Contractor. The Contractor shall pay the cost of replacing the work of other contractors destroyed or damaged by the removal of the rejected work or materials and the subsequent replacement with acceptable work.

9.11 DATE OF SUBSTANTIAL COMPLETION

9.11.1 A Certificate of Substantial Completion, which shall establish the Date of Substantial Completion, shall state the responsibilities of the Owner and the Contractor for security, maintenance, heat, utilities, damage to work, and insurance and shall fix the time within which the Contractor shall complete the items listed therein. Warranties required by the Contract Documents shall commence on the Date of Substantial Completion, unless another timeframe is stated in the Certificate of Substantial Completion. The Certificate of Substantial Completion shall not become effective until approved by DBA.

9.12 FINAL COMPLETION AND PAYMENT BY OWNER

9.12.1 The Contractor shall furnish a letter from the Design Professional attached to the Contractor's final estimate, which shall include all retainage withheld, certifying that the Design Professional has received and approved all guarantees, bonds, maintenance and operation manuals, air balance data, shop drawings, catalog data, and record documents specified in the Contract Documents.

9.12.2 Before final payment, the Contractor shall furnish to the Design Professional executed copies of the Release of Claims and Consent of the Performance and Payment Bond Surety for Final Payment. Items listed in this Section Nine (9) shall be submitted with and at the same time as the final estimate to the Design Professional and shall be promptly delivered by the Design Professional to the Owner. No final payment or release of retained amounts shall be made without complete compliance with this Section Nine (9), and approval by the Owner and DBA of the Final Pay Request, which shall include payment of all retained amounts.

9.12.3 Any claim by the Contractor to the Owner for interest on a delinquent final payment shall only be made pursuant to Ark. Code Ann. § 22-9-205.

9.13 PARTIAL OCCUPANCY OR USE

9.13.1 The Owner may occupy or use any completed or partially completed portion of the Work provided such use or occupancy is consented to by the insurer and authorized. The Contractor will prepare a list of items to be completed or corrected before partial acceptance. Upon receipt of the Contractor's list, the Design Professional will make an inspection to determine whether the Work or portion thereof is substantially complete. No portion of the work shall be considered substantially complete unless described in a Certificate of Substantial Completion Form approved by the Contractor, Owner, Design Professional and DBA.

9.13.2 The Design Professional will prepare a Certificate of Substantial Completion which shall establish the date of Substantial Completion, shall state the responsibilities of the Owner and the Contractor for security, maintenance, heat, utilities, damage to Work and insurance, identify work items to be corrected or completed by the Contractor and shall fixing the time within which the Contractor shall complete the items listed therein. Warranties required by the Contract Documents shall commence on the Date of Substantial Completion, unless another timeframe is stated in the Certificate of Substantial Completion. No retained amounts shall be paid until the Contractor, Design Professional, Owner and DBA approve a Certificate of Final Completion for all of the Work unless specifically provided for by this contract, and all other conditions for final acceptance of this Work are met to the satisfaction of the Owner and DBA.

9.13.3 If the contract documents allow for phased work and those phased sections of the project are completed, the retained amounts shall be paid in direct proportion to the value of the part of the capital improvement project completed as approved by the Contractor, Design Professional, Owner, and DBA and all other conditions of this Section Nine (9) are met by the Contractor.

9.14 FINAL INSPECTION

9.14.1 Tests, inspections, and approvals of portions of the Work required by the Contract Documents, laws, ordinances, or any public authority having jurisdiction shall be made at the appropriate time. The Contractor shall give the Design Professional timely notice of when and where tests and inspections shall be made so that the Design Professional may be present. The Contractor shall make arrangements for the testing and inspection with an independent testing laboratory.

9.14.2 The Contractor shall ensure that the final completed work is in accordance with the Contract Documents. Required certificates of testing and inspection shall be secured by the Contractor and delivered to the Design Professional, unless otherwise required by the Contract Documents. The Design Professional (or Owner, in the absence of a design professional) will coordinate the scheduling of the final inspection with all parties, to include specifically the DBA Observer. Upon completion of all work, including but not limited to the punch list items, all parties will execute the Certificate of Final Completion form setting forth the final completion date.

9.15 ASSIGNMENT OF WARRANTIES

9.15.1 All warranties of materials and workmanship running in favor of the Contractor shall be transferred and assigned to the Owner on completion of the Work and at such time as the Contractor receives final payment.

9.15.2 In case of warranties covering work performed by Subcontractors, such warranties shall be addressed to and in favor of the Owner. The Contractor shall be responsible for delivery of such warranties to the Owner prior to final acceptance of the work.

9.15.3 Delivery of guarantees or warranties shall not relieve the Contractor from any obligation assumed under any provision of the Contract. All warranties shall be for one year from the date of Substantial Completion of the Project, unless noted differently in the contract documents or extended otherwise.

9.16 ACCEPTANCE AND FINAL PAYMENT

9.16.1 Upon receipt of written notice that the Work is ready for final inspection, the Design Professional together with the Owner and DBA will conduct such inspection and when the Design Professional determines the work is acceptable to the Design Professional, Owner and DBA the Design Professional shall certify his acceptance to the Owner. Final Payment shall be the Contract Sum plus approved Change Order additions less approved Change Order deductions and less previous payments made. The Contractor shall furnish evidence that he has fully paid all debts for labor, materials, and equipment incurred in connection with the Work.

The Owner, upon approval by the Design Professional of all documentation to be provided by the Contractor in accordance with this Section 9, and approval by the Design Professional, Contractor, Owner and DBA of the Certificate of Final Completion will accept the Work and release the Contractor, except as to the conditions of the Performance and Payment Bond, any legal rights of the Owner, required guarantees and correction of faulty work after Final Payment, and shall authorize payment of the Contractor's final Request for Payment. The Contractor must allow sufficient time between the time of completion of the work and approval of the final Request for Payment for the Design Professional to assemble and check the necessary data.

9.16.2 Acceptance of final payment by the Contractor shall constitute waiver of all claims by the Contractor except those previously made in writing and identified by the Contractor as unsettled at the time of the final Request for Payment. Any claims for interest on delinquent payments shall be made pursuant to Ark. Code Ann.§ 22-9-205.

ARTICLE 10 -- PROTECTION OF PERSONS AND PROPERTY

10.1 GENERAL

10.1.1 The Contractor shall at all times exercise precaution for the safety of employees on the Project and of the public, and shall comply with all applicable provisions of federal, state and municipal safety laws and applicable building and construction codes. The Contractor shall provide and maintain passageways, guard fences, lights, and other facilities for protection required by all applicable laws. All machinery, equipment, and other physical hazards shall be guarded in accordance with all federal, state or municipal laws or regulations.

10.1.2 The Work, from commencement to completion, and until written acceptance by the Design Professional, Owner and DBA or to such earlier date or dates when the Owner may take possession and control in accordance with Section Nine (9) of these General Conditions, shall be under the charge and control of the Contractor and during such period of control by the Contractor, all risks in connection therewith shall be borne by the Contractor. The Contractor shall make good and fully repair all damages to the Project by reason of the Contractor’s negligence, and make good on all injuries to persons caused by any casualty or cause by reason of the Contractor's negligence. The Contractor shall adequately protect adjacent Property as provided by law and the Contract Documents. The Contractor shall hold the Owner and DBA harmless from any and all claims for injuries to persons or for damage to property during the control by the Contractor of the project or any part thereof.

10.1.3 The Contractor shall at all times so conduct the Work as to ensure the least possible obstruction to traffic, to the general public, and the residents in the vicinity of the Work, and to ensure the protection of persons and property. No road, street, or highway shall be closed to the public except with the permission of the Owner and proper governmental authority. Fire hydrants on or adjacent to the Work shall be kept accessible to fire fighting equipment at all times. The local fire department shall be notified of the temporary closing of any street.

ARTICLE 11 -- INSURANCE AND BONDS

11.1 INSURANCE REQUIREMENTS

11.1.1 The Contractor shall purchase and maintain in force during this Contract such insurance as is specified within the Contact Documents, from an insurance company authorized to write the prescribed insurance in the jurisdiction where the Project is located as will protect the Contractor, his subcontractors, and the Owner from claims for bodily injury, death, or property damage which may arise from operations under this Contract, and will protect him from claims set forth which may arise out of or result from the Contractor's operations under the Contract, whether such operations be by himself or by anyone directly or indirectly employed by any of them, or by anyone for whose acts may of them be liable.

The Contractor shall not commence work under this Contract until he has obtained all the insurance required, has filed the Certificate of Insurance with the Owner, and the certificate has been approved by the Owner. Each insurance policy shall contain a clause providing that it shall not be canceled by the insurance company without written notice to the Owner of intention to cancel in accordance with Ark. Code Ann. § 23-66-206. The Contractor is required to provide liability insurance with the additional insured endorsement that is primary non-contributory. All policies shall contain a waiver of the Contractor's right of subrogation against the State of Arkansas, its departments, agencies, boards, commissions, colleges and its officers, officials, agents, and employees for losses arising from work performed by or on behalf of the Contractor.

11.1.2 Workers' Compensation and Employers' Liability Insurance in statutory limits shall be secured and maintained as required by the laws of the State of Arkansas. This insurance shall cover all employees who have performed any of the obligations assumed by the Contractor under these Contract Documents including Employers' Liability Insurance. This insurance shall protect the Contractor against any and all claims resulting from injuries, sickness, disease, or death to employees engaged in work under this Contract.

11.1.3 Commercial General Liability Insurance, shall be secured and maintained in force during the period of the Contract. Prior to blasting, the Contractor shall furnish Certificate of Insurance, which shall certify that damage caused by blasting is within the coverage of his Commercial General Liability Insurance to the full limits thereof. Coverage for “completed operations” shall not be excluded under this commercial general liability Insurance section.

11.1.4 Commercial Automobile Liability Insurance shall be secured and maintained in force during this Contract. Liability coverage shall include coverage for hired and non-owned automobiles.

11.1.5 Umbrella Liability shall be secured and maintained in force during term of the Contract. The Contractor shall provide a Umbrella Liability Insurance to provide additional coverage over and above the Commercial General Liability, Commercial Business Automobile Liability and the Workers' Compensation and Employers' Liability to satisfy the Contract minimum limits. The umbrella coverage shall follow form with the Umbrella limits required as shown in section 00 73 16 Insurance Requirements.

11.1.6 Pollution Liability Insurance shall cover the Owner costs and liabilities attributable to bodily injury; property damage, including loss of use of damaged property or of property that has not been physically injured; clean-up cost; and defenses, including costs and expenses (including attorney's fees) incurred in the investigation, defense or settlement of claims.

If coverage is written on a claims-made basis, Contractor represents that any retroactive dates applicable to coverage under the policy precedes the effective date of the letter; and that continuous coverage will be maintained or an extended discovery period will be exercised for a period of three (3) years or as required by law beginning from the time that services under the contract are completed.

If the scope of work as defined in this Contract includes the disposal of any hazardous or non-hazardous materials from the Projects site, the Contractor must furnish to the Owner evidence of pollution liability insurance maintained by the disposal site operator for losses arising from the insured facility accepting waste under this Contract. Such coverage must be maintained in amounts conforming with applicable laws, rules and regulations.

Remediation: Remediation Contractor shall provide liability insurance for the removal or remediation of asbestos including the transportation and disposals of asbestos waste materials from the Project site.

11.1.7 Builder's Risk or Installation Floater Policy: The Contractor shall procure and maintain during the life of this Contract Builder's Risk or Installation Floater Insurance, and any extended coverage which shall cover damage for the capital improvement project. Perils to be insured are fire, lightning, malicious mischief, explosion, riot and civil commotion, smoke, sprinkler leakage, water damage, windstorm, hail, vandalism, and property theft on the insurable portion of the Project on a 100 percent completed value basis against damage to the equipment, structures, or material. Builders' risk policy shall include coverage for system testing and materials. The Owner and the Contractor, as their interests may appear, shall be named as the Insured. The Builders' Risk is not void if partial occupancy is required and a permission to occupy endorsement has been included when applicable. Builders' risk policy shall include "soft cost endorsement" in the amount of 10 percent of the total contract value.

Contractors will use the following information as guidance for the type of policy to procure which include but not limited to the following:

a) All new building construction and major renovations will require Builders Risk insurance;
b) Equipment installations, small renovations, utility installations, paving projects will require an Installation Floater Policy. If a determination cannot be made by the Contractor as the type of coverage required, the Contractor shall provide a written request to the Owner for clarification.

11.1.8 Proof of Insurance: The Contractor shall maintain the insurance coverage required by this contract (see Section 00 73 16 Insurance Requirements) throughout the term of this contract, and shall furnish the Owner with certificates of insurance which indicate the name of the insurance companies, the NAIC numbers, insured names, producer / agent names, telephone numbers, policy numbers, limits and types of coverage, effective and expiration dates of policies.

The Contractor shall supply the Owner updated replacement certificates not less than thirty days prior to the expiration date or renewal date of any insurance policies reflected on such certificates. Such certificates shall also contain substantially the following statement: "The insurance covered by this certificate will not be canceled, or materially altered except proper written notice pursuant Ark. Code Ann. § 23-66-206 has been received by the Owner." The notice to proceed shall not be issued until the insurance certificates have been approved by the Owner.

11.1.9 Additional Requirements: All policies shall be provided by insurers qualified to write the respective insurance in the State of Arkansas, and be in such form and include such provision as are generally considered standard provisions for the type of insurance involved. The Contractor will be financially responsible for all deductibles or self-insured retentions.

Equipment and Materials: The Contractor shall be responsible for any loss, damage, or destruction of its own property or that of any Subcontractor's equipment and materials used in conjunction with the Work. The Contractor will purchase at Contractor's own sole costs and expense such policy to cover Contractor's owned property.

Subcontractor's: The Contractor shall require all Subcontractors to provide and maintain general liability, automobile and workers' compensation insurance coverage substantially similar to those required of the Contractor. The Contractor shall require certificates of insurance from all Subcontractors as evidence of coverage. Contractor will be the responsible party for any and all claims by Subcontractors if Subcontractor fails to have appropriate insurance.

11.2 BONDS

11.2.1 Performance and Payment Bond: The Contractor shall, at the time of execution of the Contract, furnish bonds covering faithful performance of the Contract and the payment of obligations. Performance and Payment bonds, and any amendments thereto, shall be filed with the circuit clerk office in the County Courthouse of the county where the work shall be performed.

ARTICLE 12 -- UNCOVERING AND CORRECTION OF WORK

12.1 EXAMINATION OF COMPLETED WORK

12.1.1 If any portion of the work should be covered contrary to the request of the Owner, Design Professional, or Inspector or to requirements specifically expressed in the Contract Documents, it must, if required in writing by the Owner, Design Professional, or Inspector, be uncovered for his observation and replaced at the Contractor's expense.

12.2 DEFECTIVE WORK

12.2.1 Defective work, whether through the use of defective materials, the result of poor workmanship, or any other cause, shall be removed within ten days after notice is given by the Owner or Design Professional. The Work and affected materials and equipment shall be removed and replaced as necessary to comply with the Contract Documents without additional cost to the Owner. The fact that the defective work may have been previously overlooked by the Design Professional shall not constitute acceptance.

12.3 REJECTED MATERIALS

12.3.1 Materials which do not conform to the requirements of the Contract Documents, are not equal to samples approved by the Design Professional, or are in any way unsuited or unsatisfactory for the purpose for which intended, shall be rejected. Defective materials shall be removed within ten days after notice by the Design Professional. The materials shall be replaced with new materials as necessary to comply with the Contract Documents at no additional cost to the Owner. The fact that the defective material may have been previously overlooked by the Design Professional shall not constitute acceptance.

12.3.2 Should the Contractor fail to remove and replace rejected material within the specified ten days after written notice to do so, the Owner may remove and replace the material and deduct the cost from the Contract Sum.

12.4 CORRECTION OF FAULTY WORK AFTER FINAL PAYMENT

12.4.1 The approval of the final Request for Payment by the Design Professional and the making of the Final Payment by the Owner to the Contractor shall not relieve the Contractor of responsibility to correct faulty materials or workmanship promptly after receipt of written notice from the Owner until the end of the Contractor's warranty or performance and payment bond obligations or both. The Owner shall give such notice of faulty materials or workmanship promptly, after discovery of the condition. If the Contractor fails to correct the defects, promptly, after receipt of written notice from Owner, the Owner may have the work corrected at the Contractor’s expense.

ARTICLE 13 -- MISCELLANEOUS PROVISIONS

13.1 GOVERNING LAW

13.1.1 The Contract shall be governed by the laws and regulations of the STATE OF ARKANSAS. Venue for any administrative action or judicial proceedings shall be Pulaski County, Arkansas. Nothing in these General Conditions shall be construed to waive the sovereign immunity of the STATE OF ARKANSAS or any entities thereof.

13.1.2 The Contractor shall give all notices and comply with all federal, state, and local laws, ordinances, and regulations in any manner affecting the conduct of the Work. The Contractor shall indemnify and save harmless the Owner and DBA against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree whether by himself or his employees.

13.1.3 The Contractor shall comply with the laws of the local, state, and federal government regarding wages and hours of labor.

13.2 WRITTEN NOTICE

13.2.1 Consider as served when delivered in person or sent by certified or registered mail to the individual, firm, or corporation or to the last business address of such known to him who serves the notice. Failure to accept or receive the hand delivered, certified, or registered mail does not negate the consideration of serving.

13.2.2 The written Notice to Proceed with the Work shall be issued by the Design Professional after the execution of the Contract by the Owner. The Contractor shall begin and prosecute the Work uninterruptedly in a manner that will complete the Work within the time limits stated in the Contract.

13.3 TESTS AND INSPECTIONS

13.3.1 All materials and each and every part of the Work shall be subject at all times to inspection by the Owner, Design Professional, or the Inspector. The Contractor shall be held to the intent of the Contract Documents in regard to quality of materials, equipment, and workmanship, and the diligent execution of the Contract. The inspection may extend to and include plant, shop, or factory inspection of material furnished. The Contractor agrees to allow Federal or State inspectors, acting in an official capacity, to have access to the job site.

13.3.2 The Owner, Design Professional, DBA and the Inspector shall be allowed access to all parts of the Work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection for ascertaining if the Work as performed is in accordance with the requirements and the Contract Documents.

13.3.3 Inspectors shall only have authority to suspend any work in a life-threatening situation, which is being improperly done, subject to the final decision of the Owner or Design Professional. Inspectors shall have no authority to permit deviations, or to relax provisions of the Contract Documents without the written permission or instruction of the Owner, DBA or Design Professional, or delay the Contractor by failing to work with reasonable promptness.

13.4 VERBAL AGREEMENTS

13.4.1 No verbal objection, order, claim, or notice by any of the parties involved to the other parties shall affect or modify any of the terms or obligations contained in the Contract Documents. None of the terms or provisions of the Contract Documents shall be considered waived or modified unless the waiver or modification thereof is in writing, and agreed upon by the parties in the form of a Change Order approved by the Owner, Design Professional, Contractor and DBA, and no evidence shall be introduced in any proceeding of any other waiver or modification.

ARTICLE 14 -- TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 SUSPENSION OF WORK

14.1.1 The Work or any portion thereof may be suspended at any time by the Owner provided that the Owner gives the Contractor written notice of the suspension. The notice shall set forth the date on which the Work is to be suspended and the date on which the Work is to be resumed. The Contractor shall resume the Work upon written notice from the Owner within ten days after the date set forth in the notice of suspension.

14.1.2 The Owner will have the authority to suspend the work, wholly or in part, for such period of time as deemed necessary. The suspension may be due to unsuitable weather, or such other conditions as are considered unfavorable for the proper prosecution of the Work, or the failure on the part of the Contractor to fulfill the provisions of the Contract. Failure to supply material, equipment, or workmanship meeting the requirements of the Contract Documents shall be just cause for suspension of the Work. The Contractor shall not have the right to suspend operations without the Design Professional or Owner's permission.

14.2 TERMINATION BY OWNER FOR CAUSE

14.2.1 The Owner will have the right to terminate the Contract upon giving ten days written notice of the termination to the Contractor and the Contractor's surety, in the event of any default by the Contractor and upon written notice from the Design Professional to the Owner that sufficient cause exists to justify such action. In the event of termination of the Contract, the Owner may take possession of the Work and of all materials, tools, and equipment and construction equipment and machinery thereon and may finish the work by whatever method he may select. However, Owner will not have the right to terminate without providing Contractor with reasonable opportunity to cure such default to Owner's reasonable satisfaction. If the Owner does not elect to use his own forces, the surety shall furnish a competent licensed contractor within 10 working days from the written notice to the surety.

14.2.2 It shall be considered a default by the Contractor whenever he shall become insolvent; declare bankruptcy assigns assets for the benefit of his creditors; fails to provide qualified superintendence, proper materials, competent Subcontractors, competent workmen; fails to make prompt payments for conforming labor, materials, or equipment; disregards or violates provisions of the Contract Documents; disregards the Owner's, Design Professional's, or DBA instructions; fails to prosecute the Work according to the approved schedule of completion, including extensions thereof as provided for by approved Change Orders; and fails to start the Work on the date established in the Notice to Proceed.

14.3 TERMINATION BY OWNER FOR CONVENIENCE

The Owner will have the right to terminate the Contract for Convenience and without cause upon giving ten days written notice of the termination to the Contractor and Contractor's surety and DBA. Once notice is received, the Contractor shall: cease all operations as indicated by the written notice and take necessary actions or at the Owner's direction as indicated by the written notice, for the protection and preservation of the work; and terminate existing Subcontractors and purchase orders upon the effective termination date as indicated in the notice and not enter into any contracts involving Subcontractors or purchase orders.

If the contract is terminated upon the convenience of the Owner, the Contractor is entitled to receive payment for the work executed and accepted by the Owner, and the overhead and profit credit amount of 1% of the work that was left to be performed in the contract unless the termination was due to the Owner's loss of funding in which case no amount for overhead and profit will be credited.

ARTICLE 15 – DISPUTE RESOLUTION

15.1 CONTRACTUAL DISPUTES

15.1.1 In the event that a dispute, claim or controversy between the Owner and the Contractor arises regarding the requirements of the Contract, the performance of the Work, payment due the Contractor, the terms of any Change Order, or otherwise, the Contractor shall not stop, suspend or delay the Work or any part of the Work to be performed under the Contract, or under any Change Order, or as ordered by the Owner. The Contractor shall continue to diligently prosecute the Work to completion, including work required in any Change Order or as directed by the Owner.

15.2 MEDIATION

15.2.1 In the event of any dispute regarding the Contractor and the Owner (hereinafter referred to as party/parties for this section only) under this Agreement, the party shall provide written notification to the DBA Construction Section.

15.2.2 If the Owner or the Contractor are unable to negotiate a settlement of the dispute amongst themselves, the parties may participate in mediation. Mediation shall be voluntary, non-binding and all proceedings in connection with such shall be subject to this Agreement and applicable provisions of Arkansas law. A request for mediation must be made in writing to the other party and the parties shall agree upon the location of the mediation. A Mediator mutually agreed upon by the parties shall conduct the mediation process. Any mediation fees shall be borne equally between the parties. The parties shall coordinate mediation and the Owner shall notify DBA of any mediation prior to it taking place. DBA Construction Administrator or his designee may view any and all mediation proceedings. Any settlements arising out of the voluntary mediation process must be approved by DBA.

15.2.3 Notwithstanding anything to the contrary contained herein, if any dispute arises between the Parties, whether or not it requires at any time the use of dispute resolution procedures described above, in no event, nor for any reason, shall the Contractor, Architect, or Engineer interrupt the provision of services/performance to the Owner, or perform any other action that prevents, slows down, or reduces, in any way, the provisions of the Agreement unless: (a) authority to do so is granted by the Owner and approved by DBA or (b) the Agreement has been terminated by the State. Nothing in these contract documents, including the use of mediation, shall be construed to waive the sovereign immunity of the State of Arkansas or any entities thereof.

15.3 ARBITRATION

15.3.1 In the event of any dispute regarding the Contractor and the Owner (hereinafter referred to as party/parties for this section only) under this Agreement, the party shall provide written notification to the DBA Construction Section.

15.3.2 If the Owner or the Contractor are unable to negotiate a settlement of the dispute amongst themselves, the parties may participate in arbitration. Arbitration shall be voluntary, binding and all proceedings in connection with such shall be subject to this Agreement and applicable provisions of Arkansas law. A request for arbitration must be made in writing to the other party and the parties shall agree upon the Arbitrator, process and procedures and the location of arbitration. Any arbitration fees shall be borne equally between the parties. The parties shall coordinate arbitration and the Owner shall notify DBA of any arbitration prior to it taking place. DBA Construction Administrator or his designee may view any and all arbitration proceedings. Any settlements arising out of the voluntary arbitration process must be approved by DBA.

15.3.3 Notwithstanding anything to the contrary contained herein, if any dispute arises between the Parties, whether or not it requires at any time the use of dispute resolution procedures described above, in no event, nor for any reason, shall the Contractor, Architect, or Engineer interrupt the provision of services/performance to the Owner, or perform any other action that prevents, slows down, or reduces, in any way, the provisions of the Agreement unless: (a) authority to do so is granted by the Owner and approved by DBA or (b) the Agreement has been terminated by the State. Any award rendered by the arbitrator shall be final with the approval of DBA. Nothing in these contract documents, including the use of arbitration, shall be construed to waive the sovereign immunity of the State of Arkansas or any entities thereof.

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Insurance Requirements
Section 00 73 16 / Rev: August 2021

Article 11 - Insurance and Bonds
(see General Conditions Article 11 for additional information)

1) Subparagraph 11.1.1, add the following sentence:

The amount of such insurance shall be not less than the following or any limits required by law.

2) Subparagraph 11.1.2, add the following clause:

11.1.2.1 Workers' Compensation

a. State		Statutory
b. Applicable Federal		Statutory
c. Employers' Liability	Per Accident:	$100,000
	Disease, Policy Limit:	$500,000
	Disease, Each Employee:	$100,000

3) Subparagraph 11.1.3, add the following clause:

11.1.3.1 Commercial General Liability

General Aggregate:	Per Project Aggregate:	$2,000,000
Completed Operations: (to be maintained for one year after final payment)	Aggregate:	$1,000,000
Personal Injury:	Each Occurrence:	$1,000,000
Each Occurrence Limit:	Each Occurrence:	$1,000,000

4) Subparagraph 11.1.4, add the following clause:

11.1.4.1 Automobile Liability: (including, non-owned and hired vehicles)	Combined Single Limit:	$1,000,000

5) Subparagraph 11.1.5, add the following clause:

11.1.5.1 Umbrella Liability:	Each Occurrence:	$2,000,000

6) Subparagraph 11.1.6, add the following clause:

11.1.6.1 Pollution Liability:	Per Loss:	N/A
	Aggregate:	$0

7) Subparagraph 11.1.7, add the following clause:

11.1.7.1 Builder's Risk or Installation Floater Policy:	$ = Contract Amount

8) Contractor shall deliver to the Owner a copy of each Insurance certificate and any other requested supporting document for the Owners review and approval prior to the issuance of the Notice to Proceed and any work being performed.

Please Note: Policy Certificates of Insurance shall state "The insurance covered by this certificate will not be cancelled, or materially altered except after proper written notice pursuant Ark. Code Ann. § 23-66-206 has been received by the Owner."

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Health and Safety Requirements
Section 00 73 19 / Rev: August 2021

Pursuant to Ark. Code Ann. §22-9-212 et. Seq., the Contractor agrees that all trench or excavation having a depth of over five feet will be performed in accordance per the Section.

The Contractor agrees to provide all trench or excavation safety systems as mandated by Part 1926–Safety and Health Regulations for Construction, Subpart P – Excavations and any other applicable Federal Regulations. See attached Subpart P - Excavations.

The Contractor is responsible for completing all trench and excavation with proper safety in place during performance of the Work.

(c) *Coaming*—The raised frame, as around a hatchway in the deck, to keep out water.

(d) *Jacob's ladder*—A marine ladder of rope or chain with wooden or metal rungs.

(e) *Rail*, for the purpose of § 1926.605, means a light structure serving as a guard at the outer edge of a ship's deck.

Subpart P—Excavations

AUTHORITY: 40 U.S.C. 333; 29 U.S.C. 653, 655, and 657; Secretary of Labor's Order No. 12–71 (36 FR 8754), 8–76 (41 FR 25059), 9–83 (48 FR 35736), or 1–2012 (77 FR 3912), as applicable; and 29 CFR part 1911.

SOURCE: 54 FR 45959, Oct. 31, 1989, unless otherwise noted.

§ 1926.650 Scope, application, and definitions applicable to this subpart.

(a) *Scope and application.* This subpart applies to all open excavations made in the earth's surface. Excavations are defined to include trenches.

(b) *Definitions applicable to this subpart.*

Accepted engineering practices means those requirements which are compatible with standards of practice required by a registered professional engineer.

Aluminum Hydraulic Shoring means a pre-engineered shoring system comprised of aluminum hydraulic cylinders (crossbraces) used in conjunction with vertical rails (uprights) or horizontal rails (walers). Such system is designed, specifically to support the sidewalls of an excavation and prevent cave-ins.

Bell-bottom pier hole means a type of shaft or footing excavation, the bottom of which is made larger than the cross section above to form a belled shape.

Benching (Benching system) means a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

Cave-in means the separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.

Competent person means one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Cross braces mean the horizontal members of a shoring system installed perpendicular to the sides of the excavation, the ends of which bear against either uprights or wales.

Excavation means any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

Faces or *sides* means the vertical or inclined earth surfaces formed as a result of excavation work.

Failure means the breakage, displacement, or permanent deformation of a structural member or connection so as to reduce its structural integrity and its supportive capabilities.

Hazardous atmosphere means an atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.

Kickout means the accidental release or failure of a cross brace.

Protective system means a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

Ramp means an inclined walking or working surface that is used to gain access to one point from another, and is constructed from earth or from structural materials such as steel or wood.

Registered Professional Engineer means a person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective

systems'' or ''tabulated data'' to be used in interstate commerce.

Sheeting means the members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

Shield (Shield system) means a structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either premanufactured or job-built in accordance with §1926.652 (c)(3) or (c)(4). Shields used in trenches are usually referred to as ''trench boxes'' or ''trench shields.''

Shoring (Shoring system) means a structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.

Sides. See ''Faces.''

Sloping (Sloping system) means a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

Stable rock means natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against caving-in or movement by rock bolts or by another protective system that has been designed by a registered professional engineer.

Structural ramp means a ramp built of steel or wood, usually used for vehicle access. Ramps made of soil or rock are not considered structural ramps.

Support system means a structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

Tabulated data means tables and charts approved by a registered professional engineer and used to design and construct a protective system.

Trench (Trench excavation) means a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m). If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet (4.6 m) or less (measured at the bottom of the excavation), the excavation is also considered to be a trench.

Trench box. See ''Shield.''

Trench shield. See ''Shield.''

Uprights means the vertical members of a trench shoring system placed in contact with the earth and usually positioned so that individual members do not contact each other. Uprights placed so that individual members are closely spaced, in contact with or interconnected to each other, are often called ''sheeting.''

Wales means horizontal members of a shoring system placed parallel to the excavation face whose sides bear against the vertical members of the shoring system or earth.

§ 1926.651 Specific excavation requirements.

(a) *Surface encumbrances.* All surface encumbrances that are located so as to create a hazard to employees shall be removed or supported, as necessary, to safeguard employees.

(b) *Underground installations.* (1) The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation.

(2) Utility companies or owners shall be contacted within established or customary local response times, advised of the proposed work, and asked to establish the location of the utility underground installations prior to the start of actual excavation. When utility companies or owners cannot respond to a request to locate underground utility

installations within 24 hours (unless a longer period is required by state or local law), or cannot establish the exact location of these installations, the employer may proceed, provided the employer does so with caution, and provided detection equipment or other acceptable means to locate utility installations are used.

(3) When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by safe and acceptable means.

(4) While the excavation is open, underground installations shall be protected, supported or removed as necessary to safeguard employees.

(c) *Access and egress*—(1) *Structural ramps.* (i) Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design, and shall be constructed in accordance with the design.

(ii) Ramps and runways constructed of two or more structural members shall have the structural members connected together to prevent displacement.

(iii) Structural members used for ramps and runways shall be of uniform thickness.

(iv) Cleats or other appropriate means used to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent tripping.

(v) Structural ramps used in lieu of steps shall be provided with cleats or other surface treatments on the top surface to prevent slipping.

(2) *Means of egress from trench excavations.* A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are 4 feet (1.22 m) or more in depth so as to require no more than 25 feet (7.62 m) of lateral travel for employees.

(d) *Exposure to vehicular traffic.* Employees exposed to public vehicular traffic shall be provided with, and shall wear, warning vests or other suitable garments marked with or made of reflectorized or high-visibility material.

(e) *Exposure to falling loads.* No employee shall be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped, in accordance with §1926.601(b)(6), to provide adequate protection for the operator during loading and unloading operations.

(f) *Warning system for mobile equipment.* When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.

(g) *Hazardous atmospheres*—(1) *Testing and controls.* In addition to the requirements set forth in subparts D and E of this part (29 CFR 1926.50–1926.107) to prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions, the following requirements shall apply:

(i) Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation shall be tested before employees enter excavations greater than 4 feet (1.22 m) in depth.

(ii) Adequate precautions shall be taken to prevent employee exposure to atmospheres containing less than 19.5 percent oxygen and other hazardous atmospheres. These precautions include providing proper respiratory protection or ventilation in accordance with subparts D and E of this part respectively.

(iii) Adequate precaution shall be taken such as providing ventilation, to prevent employee exposure to an atmosphere containing a concentration

of a flammable gas in excess of 20 percent of the lower flammable limit of the gas.

(iv) When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to ensure that the atmosphere remains safe.

(2) *Emergency rescue equipment.* (i) Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment shall be attended when in use.

(ii) Employees entering bell-bottom pier holes, or other similar deep and confined footing excavations, shall wear a harness with a life-line securely attached to it. The lifeline shall be separate from any line used to handle materials, and shall be individually attended at all times while the employee wearing the lifeline is in the excavation.

(h) *Protection from hazards associated with water accumulation.* (1) Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.

(2) If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored by a competent person to ensure proper operation.

(3) If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will require an inspection by a competent person and compliance with paragraphs (h)(1) and (h)(2) of this section.

(i) *Stability of adjacent structures.* (1) Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of employees.

(2) Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees shall not be permitted except when:

(i) A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or

(ii) The excavation is in stable rock; or

(iii) A registered professional engineer has approved the determination that the structure is sufficently removed from the excavation so as to be unaffected by the excavation activity; or

(iv) A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.

(3) Sidewalks, pavements, and appurtenant structure shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

(j) *Protection of employees from loose rock or soil.* (1) Adequate protection shall be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection shall consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or other means that provide equivalent protection.

(2) Employees shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least 2 feet (.61 m) from the edge of excavations, or by the use of retaining devices that are sufficient to prevent

materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

(k) *Inspections.* (1) Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.

(2) Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

(l) Walkways shall be provided where employees or equipment are required or permitted to cross over excavations. Guardrails which comply with §1926.502(b) shall be provided where walkways are 6 feet (1.8 m) or more above lower levels.

[54 FR 45959, Oct. 31, 1989, as amended at 59 FR 40730, Aug. 9, 1994]

§ 1926.652 Requirements for protective systems.

(a) *Protection of employees in excavations.* (1) Each employee in an excavation shall be protected from cave-ins by an adequate protective system designed in accordance with paragraph (b) or (c) of this section except when:

(i) Excavations are made entirely in stable rock; or

(ii) Excavations are less than 5 feet (1.52m) in depth and examination of the ground by a competent person provides no indication of a potential cave-in.

(2) Protective systems shall have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

(b) *Design of sloping and benching systems.* The slopes and configurations of sloping and benching systems shall be selected and constructed by the employer or his designee and shall be in accordance with the requirements of paragraph (b)(1); or, in the alternative, paragraph (b)(2); or, in the alternative, paragraph (b)(3), or, in the alternative, paragraph (b)(4), as follows:

(1) *Option (1)—Allowable configurations and slopes.* (i) Excavations shall be sloped at an angle not steeper than one and one-half horizontal to one vertical (34 degrees measured from the horizontal), unless the employer uses one of the other options listed below.

(ii) Slopes specified in paragraph (b)(1)(i) of this section, shall be excavated to form configurations that are in accordance with the slopes shown for Type C soil in appendix B to this subpart.

(2) *Option (2)—Determination of slopes and configurations using Appendices A and B.* Maximum allowable slopes, and allowable configurations for sloping and benching systems, shall be determined in accordance with the conditions and requirements set forth in appendices A and B to this subpart.

(3) *Option (3)—Designs using other tabulated data.* (i) Designs of sloping or benching systems shall be selected from and be in accordance with tabulated data, such as tables and charts.

(ii) The tabulated data shall be in written form and shall include all of the following:

(A) Identification of the parameters that affect the selection of a sloping or benching system drawn from such data;

(B) Identification of the limits of use of the data, to include the magnitude and configuration of slopes determined to be safe;

(C) Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

(iii) At least one copy of the tabulated data which identifies the registered professional engineer who approved the data, shall be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data shall be made available to the Secretary upon request.

(4) *Option (4)—Design by a registered professional engineer.* (i) Sloping and benching systems not utilizing Option (1) or Option (2) or Option (3) under paragraph (b) of this section shall be approved by a registered professional engineer.

(ii) Designs shall be in written form and shall include at least the following:

(A) The magnitude of the slopes that were determined to be safe for the particular project;

(B) The configurations that were determined to be safe for the particular project; and

(C) The identity of the registered professional engineer approving the design.

(iii) At least one copy of the design shall be maintained at the jobsite while the slope is being constructed. After that time the design need not be at the jobsite, but a copy shall be made available to the Secretary upon request.

(c) *Design of support systems, shield systems, and other protective systems.* Designs of support systems shield systems, and other protective systems shall be selected and constructed by the employer or his designee and shall be in accordance with the requirements of paragraph (c)(1); or, in the alternative, paragraph (c)(2); or, in the alternative, paragraph (c)(3); or, in the alternative, paragraph (c)(4) as follows:

(1) *Option (1)—Designs using appendices A, C and D.* Designs for timber shoring in trenches shall be determined in accordance with the conditions and requirements set forth in appendices A and C to this subpart. Designs for aluminum hydraulic shoring shall be in accordance with paragraph (c)(2) of this section, but if manufacturer's tabulated data cannot be utilized, designs shall be in accordance with appendix D.

(2) *Option (2)—Designs Using Manufacturer's Tabulated Data.* (i) Design of support systems, shield systems, or other protective systems that are drawn from manufacturer's tabulated data shall be in accordance with all specifications, recommendations, and limitations issued or made by the manufacturer.

(ii) Deviation from the specifications, recommendations, and limitations issued or made by the manufacturer shall only be allowed after the manufacturer issues specific written approval.

(iii) Manufacturer's specifications, recommendations, and limitations, and manufacturer's approval to deviate from the specifications, recommendations, and limitations shall be in written form at the jobsite during construction of the protective system. After that time this data may be stored off the jobsite, but a copy shall be made available to the Secretary upon request.

(3) *Option (3)—Designs using other tabulated data.* (i) Designs of support systems, shield systems, or other protective systems shall be selected from and be in accordance with tabulated data, such as tables and charts.

(ii) The tabulated data shall be in written form and include all of the following:

(A) Identification of the parameters that affect the selection of a protective system drawn from such data;

(B) Identification of the limits of use of the data;

(C) Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

(iii) At least one copy of the tabulated data, which identifies the registered professional engineer who approved the data, shall be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data shall be made available to the Secretary upon request.

(4) *Option (4)—Design by a registered professional engineer.* (i) Support systems, shield systems, and other protective systems not utilizing Option 1, Option 2 or Option 3, above, shall be approved by a registered professional engineer.

(ii) Designs shall be in written form and shall include the following:

(A) A plan indicating the sizes, types, and configurations of the materials to be used in the protective system; and

(B) The identity of the registered professional engineer approving the design.

(iii) At least one copy of the design shall be maintained at the jobsite during construction of the protective system. After that time, the design may be stored off the jobsite, but a copy of the design shall be made available to the Secretary upon request.

(d) *Materials and equipment.* (1) Materials and equipment used for protective systems shall be free from damage or defects that might impair their proper function.

(2) Manufactured materials and equipment used for protective systems shall be used and maintained in a manner that is consistent with the recommendations of the manufacturer, and in a manner that will prevent employee exposure to hazards.

(3) When material or equipment that is used for protective systems is damaged, a competent person shall examine the material or equipment and evaluate its suitability for continued use. If the competent person cannot assure the material or equipment is able to support the intended loads or is otherwise suitable for safe use, then such material or equipment shall be removed from service, and shall be evaluated and approved by a registered professional engineer before being returned to service.

(e) *Installation and removal of support*—(1) *General.* (i) Members of support systems shall be securely connected together to prevent sliding, falling, kickouts, or other predictable failure.

(ii) Support systems shall be installed and removed in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the support system.

(iii) Individual members of support systems shall not be subjected to loads exceeding those which those members were designed to withstand.

(iv) Before temporary removal of individual members begins, additional precautions shall be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system.

(v) Removal shall begin at, and progress from, the bottom of the excavation. Members shall be released slowly so as to note any indication of possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation.

(vi) Backfilling shall progress together with the removal of support systems from excavations.

(2) *Additional requirements for support systems for trench excavations.* (i) Excavation of material to a level no greater than 2 feet (.61 m) below the bottom of the members of a support system shall be permitted, but only if the system is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the support system.

(ii) Installation of a support system shall be closely coordinated with the excavation of trenches.

(f) *Sloping and benching systems.* Employees shall not be permitted to work on the faces of sloped or benched excavations at levels above other employees except when employees at the lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.

(g) *Shield systems*—(1) *General.* (i) Shield systems shall not be subjected to loads exceeding those which the system was designed to withstand.

(ii) Shields shall be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads.

(iii) Employees shall be protected from the hazard of cave-ins when entering or exiting the areas protected by shields.

(iv) Employees shall not be allowed in shields when shields are being installed, removed, or moved vertically.

(2) *Additional requirement for shield systems used in trench excavations.* Excavations of earth material to a level not greater than 2 feet (.61 m) below the bottom of a shield shall be permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.

APPENDIX A TO SUBPART P OF PART 1926—SOIL CLASSIFICATION

(a) *Scope and application*—(1) *Scope.* This appendix describes a method of classifying soil and rock deposits based on site and environmental conditions, and on the structure and composition of the earth deposits. The appendix contains definitions, sets forth requirements, and describes acceptable visual and manual tests for use in classifying soils.

(2) *Application.* This appendix applies when a sloping or benching system is designed in accordance with the requirements set forth in §1926.652(b)(2) as a method of protection for employees from cave-ins. This appendix also applies when timber shoring for excavations is designed as a method of protection from cave-ins in accordance with appendix C to subpart P of part 1926, and when aluminum hydraulic shoring is designed in accordance with appendix D. This appendix also applies if other protective systems are designed and selected for use from data prepared in accordance with the requirements set forth in §1926.652(c), and the use of the data is predicated on the use of the soil classification system set forth in this appendix.

(b) *Definitions.* The definitions and examples given below are based on, in whole or in part, the following: American Society for Testing Materials (ASTM) Standards D653–85 and D2488; The Unified Soils Classification System, the U.S. Department of Agriculture (USDA) Textural Classification Scheme; and The National Bureau of Standards Report BSS–121.

Cemented soil means a soil in which the particles are held together by a chemical agent, such as calcium carbonate, such that a hand-size sample cannot be crushed into powder or individual soil particles by finger pressure.

Cohesive soil means clay (fine grained soil), or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical sideslopes, and is plastic when moist. Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.

Dry soil means soil that does not exhibit visible signs of moisture content.

Fissured means a soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface.

Granular soil means gravel, sand, or silt, (coarse grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

Layered system means two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered.

Moist soil means a condition in which a soil looks and feels damp. Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.

Plastic means a property of a soil which allows the soil to be deformed or molded without cracking, or appreciable volume change.

Saturated soil means a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or sheer vane.

Soil classification system means, for the purpose of this subpart, a method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type A, Type B, and Type C, in decreasing order of stability. The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the environmental conditions of exposure.

Stable rock means natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.

Submerged soil means soil which is underwater or is free seeping.

Type A means cohesive soils with an unconfined compressive strength of 1.5 ton per square foot (tsf) (144 kPa) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, no soil is Type A if:

(i) The soil is fissured; or

(ii) The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or

(iii) The soil has been previously disturbed; or

(iv) The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or

(v) The material is subject to other factors that would require it to be classified as a less stable material.

Type B means:

(i) Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or

(ii) Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.

(iii) Previously disturbed soils except those which would otherwise be classified as Type C soil.

(iv) Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or

(v) Dry rock that is not stable; or

(vi) Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.

Type C means:

(i) Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less; or

(ii) Granular soils including gravel, sand, and loamy sand; or

(iii) Submerged soil or soil from which water is freely seeping; or

(iv) Submerged rock that is not stable; or

(v) Material in a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or steeper.

Unconfined compressive strength means the load per unit area at which a soil will fail in compression. It can be determined by laboratory testing, or estimated in the field using a pocket penetrometer, by thumb penetration tests, and other methods.

Wet soil means soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material will slump or begin to flow when vibrated. Granular material that would exhibit cohesive properties when moist will lose those cohesive properties when wet.

(c) *Requirements*—(1) *Classification of soil and rock deposits.* Each soil and rock deposit shall be classified by a competent person as Stable Rock, Type A, Type B, or Type C in accordance with the definitions set forth in paragraph (b) of this appendix.

(2) *Basis of classification.* The classification of the deposits shall be made based on the results of at least one visual and at least one manual analysis. Such analyses shall be conducted by a competent person using tests described in paragraph (d) below, or in other recognized methods of soil classification and testing such as those adopted by the America Society for Testing Materials, or the U.S. Department of Agriculture textural classification system.

(3) *Visual and manual analyses.* The visual and manual analyses, such as those noted as being acceptable in paragraph (d) of this appendix, shall be designed and conducted to provide sufficient quantitative and qualitative information as may be necessary to identify properly the properties, factors, and conditions affecting the classification of the deposits.

(4) *Layered systems.* In a layered system, the system shall be classified in accordance with its weakest layer. However, each layer may be classified individually where a more stable layer lies under a less stable layer.

(5) *Reclassification.* If, after classifying a deposit, the properties, factors, or conditions affecting its classification change in any way, the changes shall be evaluated by a competent person. The deposit shall be reclassified as necessary to reflect the changed circumstances.

(d) *Acceptable visual and manual tests*—(1) *Visual tests.* Visual analysis is conducted to determine qualitative information regarding the excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation, and the soil taken as samples from excavated material.

(i) Observe samples of soil that are excavated and soil in the sides of the excavation. Estimate the range of particle sizes and the relative amounts of the particle sizes. Soil that is primarily composed of fine-grained material is cohesive material. Soil composed primarily of coarse-grained sand or gravel is granular material.

(ii) Observe soil as it is excavated. Soil that remains in clumps when excavated is cohesive. Soil that breaks up easily and does not stay in clumps is granular.

(iii) Observe the side of the opened excavation and the surface area adjacent to the excavation. Crack-like openings such as tension cracks could indicate fissured material. If chunks of soil spall off a vertical side, the soil could be fissured. Small spalls are evidence of moving ground and are indications of potentially hazardous situations.

(iv) Observe the area adjacent to the excavation and the excavation itself for evidence of existing utility and other underground structures, and to identify previously disturbed soil.

(v) Observe the opened side of the excavation to identify layered systems. Examine layered systems to identify if the layers slope toward the excavation. Estimate the degree of slope of the layers.

(vi) Observe the area adjacent to the excavation and the sides of the opened excavation for evidence of surface water, water seeping from the sides of the excavation, or the location of the level of the water table.

(vii) Observe the area adjacent to the excavation and the area within the excavation for sources of vibration that may affect the stability of the excavation face.

(2) *Manual tests.* Manual analysis of soil samples is conducted to determine quantitative as well as qualitative properties of soil and to provide more information in order to classify soil properly.

(i) *Plasticity.* Mold a moist or wet sample of soil into a ball and attempt to roll it into threads as thin as ⅛-inch in diameter. Cohesive material can be successfully rolled into threads without crumbling. For example, if at least a two inch (50 mm) length of ⅛-inch thread can be held on one end without tearing, the soil is cohesive.

(ii) *Dry strength.* If the soil is dry and crumbles on its own or with moderate pressure into individual grains or fine powder, it is granular (any combination of gravel, sand, or silt). If the soil is dry and falls into clumps which break up into smaller clumps, but the smaller clumps can only be broken up with difficulty, it may be clay in any combination with gravel, sand or silt. If the dry soil breaks into clumps which do not break up into small clumps and which can only be broken with difficulty, and there is no visual indication the soil is fissured, the soil may be considered unfissured.

(iii) *Thumb penetration.* The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive soils. (This test is based on the thumb penetration test described in American Society for Testing and Materials (ASTM) Standard designation D2488—"Standard Recommended Practice for Description of Soils (Visual—Manual Procedure).") Type A soils with an unconfined compressive strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great effort. Type C soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb, and can be molded by light finger pressure. This test should be conducted on an undisturbed soil sample, such as a large clump of spoil, as soon as practicable after excavation to keep to a minimum the effects of exposure to drying influences. If the excavation is later exposed to wetting influences (rain, flooding), the classification of the soil must be changed accordingly.

(iv) *Other strength tests.* Estimates of unconfined compressive strength of soils can also be obtained by use of a pocket penetrometer or by using a hand-operated shearvane.

(v) *Drying test.* The basic purpose of the drying test is to differentiate between cohesive material with fissures, unfissured cohesive material, and granular material. The procedure for the drying test involves drying a sample of soil that is approximately one inch thick (2.54 cm) and six inches (15.24 cm) in diameter until it is thoroughly dry:

(A) If the sample develops cracks as it dries, significant fissures are indicated.

(B) Samples that dry without cracking are to be broken by hand. If considerable force is necessary to break a sample, the soil has significant cohesive material content. The soil can be classified as an unfissured cohesive material and the unconfined compressive strength should be determined.

(C) If a sample breaks easily by hand, it is either a fissured cohesive material or a granular material. To distinguish between the two, pulverize the dried clumps of the sample by hand or by stepping on them. If the clumps do not pulverize easily, the material is cohesive with fissures. If they pulverize easily into very small fragments, the material is granular.

[85 FR 8743, Feb. 18, 2020]

APPENDIX B TO SUBPART P OF PART 1926—SLOPING AND BENCHING

(a) *Scope and application.* This appendix contains specifications for sloping and benching when used as methods of protecting employees working in excavations from cave-ins. The requirements of this appendix apply when the design of sloping and benching protective systems is to be performed in accordance with the requirements set forth in §1926.652(b)(2).

(b) *Definitions.*

Actual slope means the slope to which an excavation face is excavated.

Distress means that the soil is in a condition where a cave-in is imminent or is likely to occur. Distress is evidenced by such phenomena as the development of fissures in the face of or adjacent to an open excavation; the subsidence of the edge of an excavation; the slumping of material from the face or the bulging or heaving of material from the bottom of an excavation; the spalling of material from the face of an excavation; and ravelling, i.e., small amounts of material such as pebbles or little clumps of material suddenly separating from the face of an excavation and trickling or rolling down into the excavation.

Maximum allowable slope means the steepest incline of an excavation face that is acceptable for the most favorable site conditions as protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V).

Short term exposure means a period of time less than or equal to 24 hours that an excavation is open.

(c) *Requirements*—(1) *Soil classification.* Soil and rock deposits shall be classified in accordance with appendix A to subpart P of part 1926.

(2) *Maximum allowable slope.* The maximum allowable slope for a soil or rock deposit shall be determined from Table B–1 of this appendix.

(3) *Actual slope.* (i) The actual slope shall not be steeper than the maximum allowable slope.

(ii) The actual slope shall be less steep than the maximum allowable slope, when there are signs of distress. If that situation occurs, the slope shall be cut back to an actual slope which is at least ½ horizontal to one vertical (½H:1V) less steep than the maximum allowable slope.

(iii) When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person shall determine the degree to which the actual slope must be reduced below the maximum

allowable slope, and shall assure that such reduction is achieved. Surcharge loads from adjacent structures shall be evaluated in accordance with §1926.651(i).

(4) *Configurations.* Configurations of sloping and benching systems shall be in accordance with Figure B–1.

TABLE B–1

MAXIMUM ALLOWABLE SLOPES

SOIL OR ROCK TYPE	MAXIMUM ALLOWABLE SLOPES (H:V) [1] FOR EXCAVATIONS LESS THAN 20 FEET DEEP [3]
STABLE ROCK TYPE A [2] TYPE B TYPE C	VERTICAL (90°) 3/4 : 1 (53°) 1:1 (45°) 1½: 1 (34°)

NOTES:

1. Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.
2. A short-term maximum allowable slope of 1/2H:1V (63°) is allowed in excavations in Type A soil that are 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4H:1V (53°).
3. Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

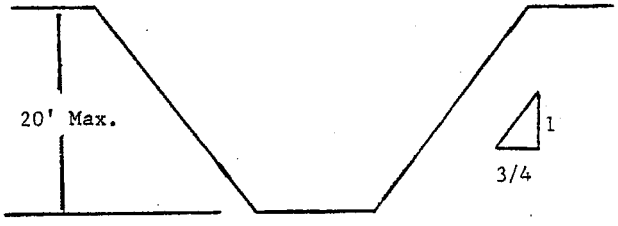
Figure B–1

Slope Configurations

(All slopes stated below are in the horizontal to vertical ratio)

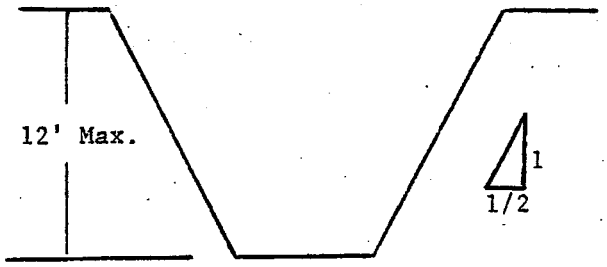
B–1.1 Excavations made in Type A soil.

1. All simple slope excavation 20 feet or less in depth shall have a maximum allowable slope of ¾:1.



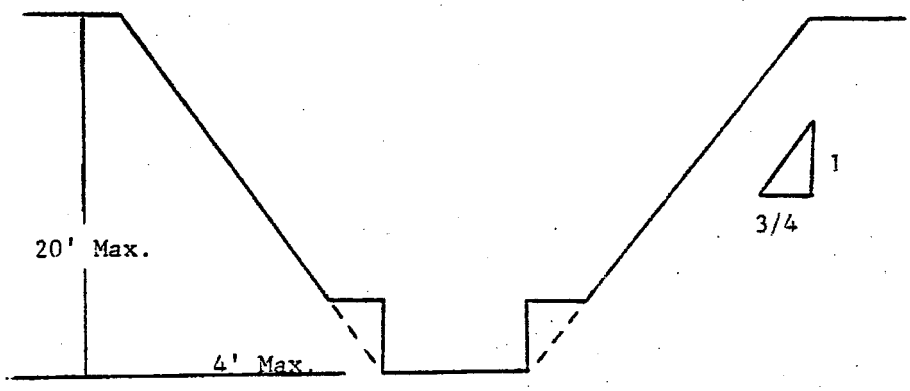
SIMPLE SLOPE—GENERAL

Exception: Simple slope excavations which are open 24 hours or less (short term) and which are 12 feet or less in depth shall have a maximum allowable slope of ½:1.

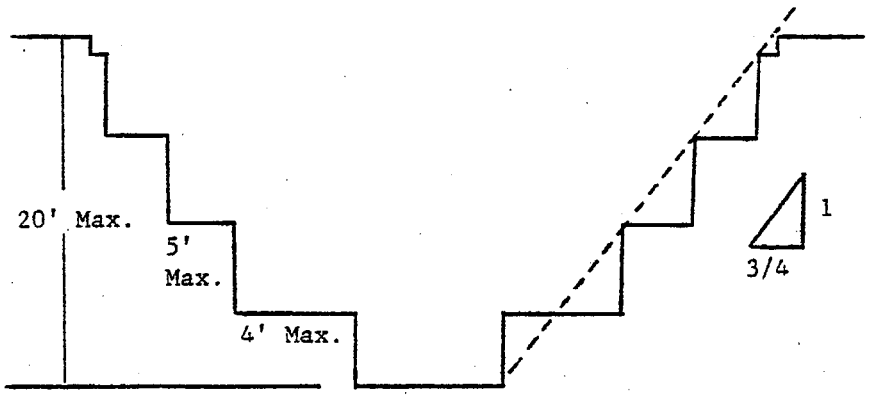


SIMPLE SLOPE—SHORT TERM

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of ¾ to 1 and maximum bench dimensions as follows:

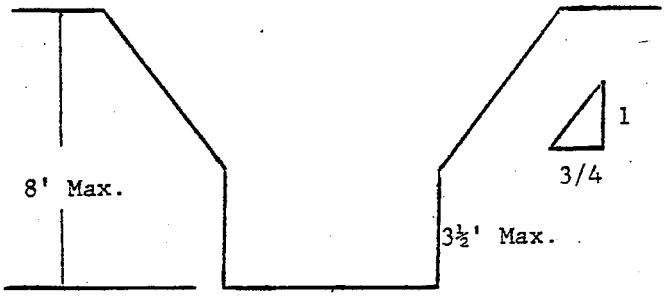


SIMPLE BENCH



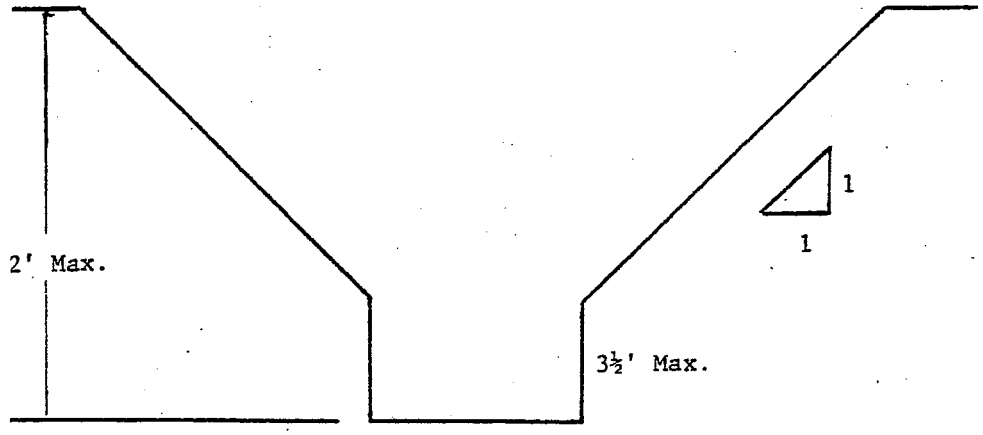
MULTIPLE BENCH

3. All excavations 8 feet or less in depth which have unsupported vertically sided lower portions shall have a maximum vertical side of 3½ feet.



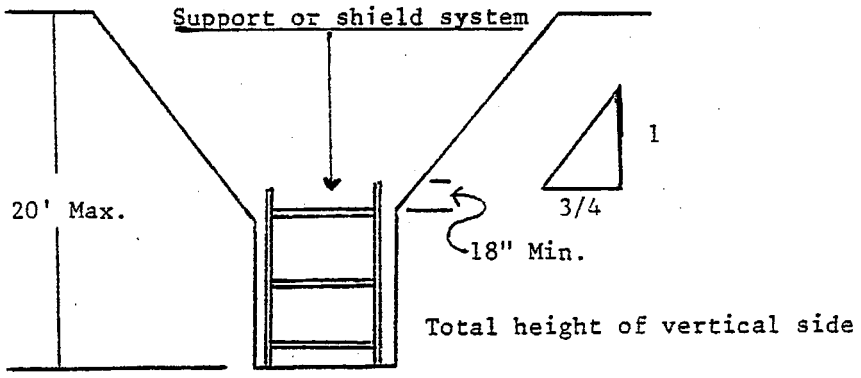
UNSUPPORTED VERTICALLY SIDED LOWER PORTION—MAXIMUM 8 FEET IN DEPTH

All excavations more than 8 feet but not more than 12 feet in depth which unsupported vertically sided lower portions shall have a maximum allowable slope of 1:1 and a maximum vertical side of 3½ feet.



UNSUPPORTED VERTICALLY SIDED LOWER PORTION—MAXIMUM 12 FEET IN DEPTH

All excavations 20 feet or less in depth which have vertically sided lower portions that are supported or shielded shall have a maximum allowable slope of ¾:1. The support or shield system must extend at least 18 inches above the top of the vertical side.

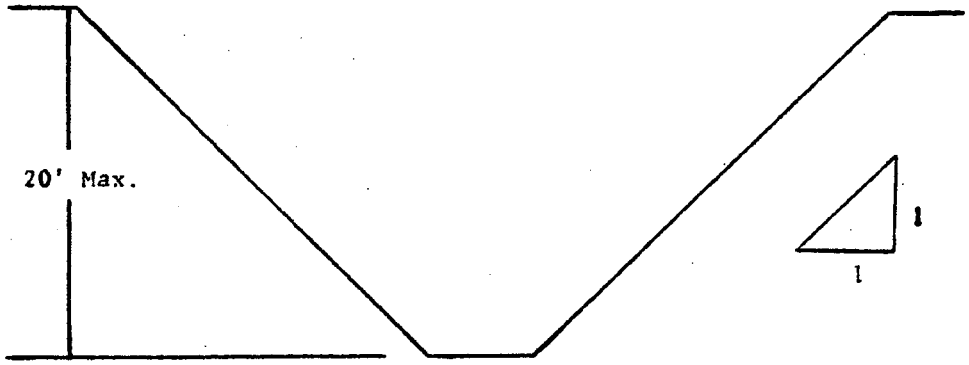


SUPPORTED OR SHIELDED VERTICALLY SIDED LOWER PORTION

4. All other simple slope, compound slope, and vertically sided lower portion excavations shall be in accordance with the other options permitted under §1926.652(b).

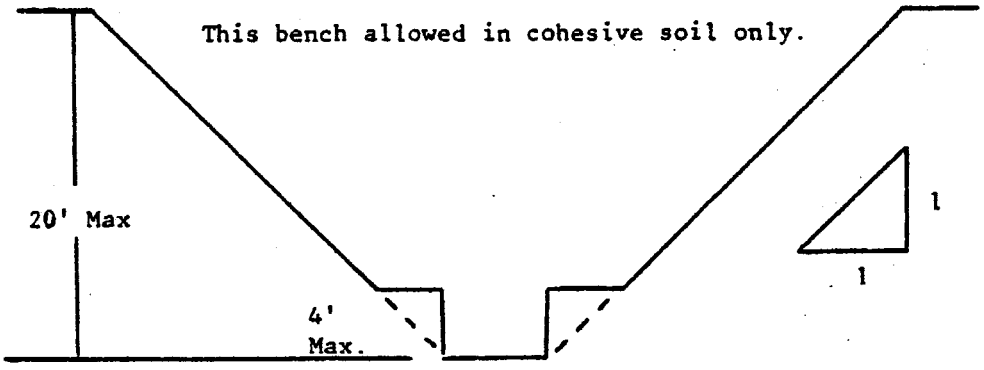
B–1.2 Excavations Made in Type B Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.

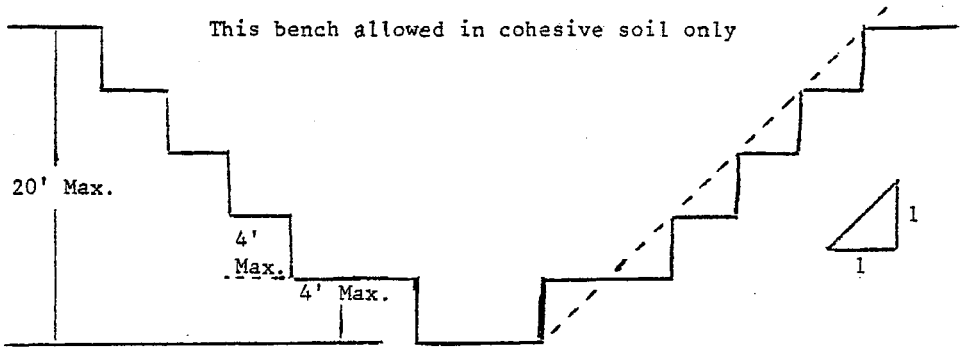


SIMPLE SLOPE

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1 and maximum bench dimensions as follows:

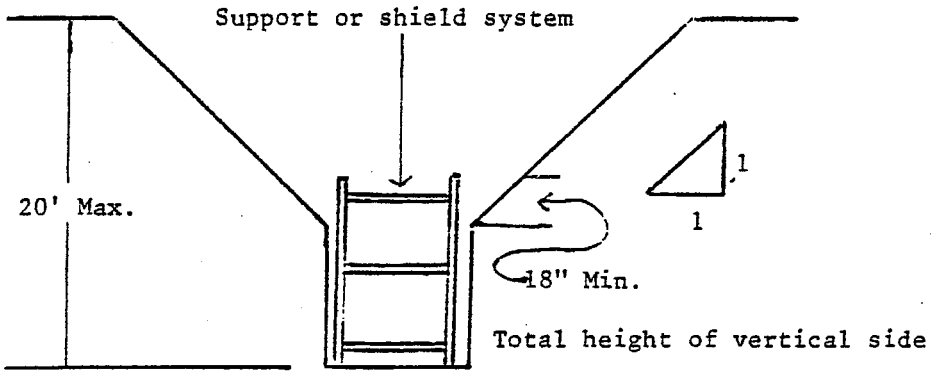


SINGLE BENCH



MULTIPLE BENCH

3. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1:1.

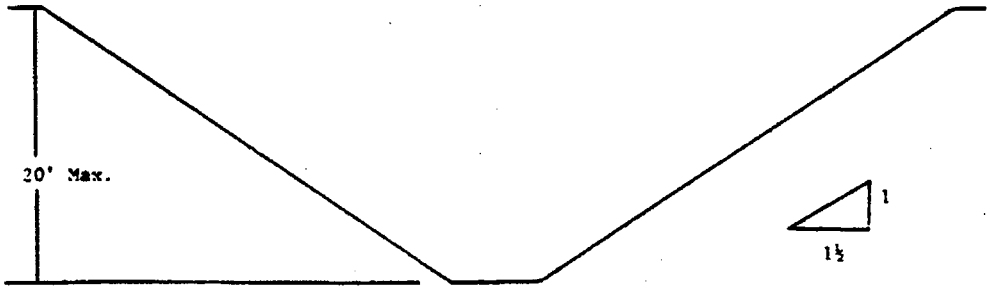


VERTICALLY SIDED LOWER PORTION

4. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

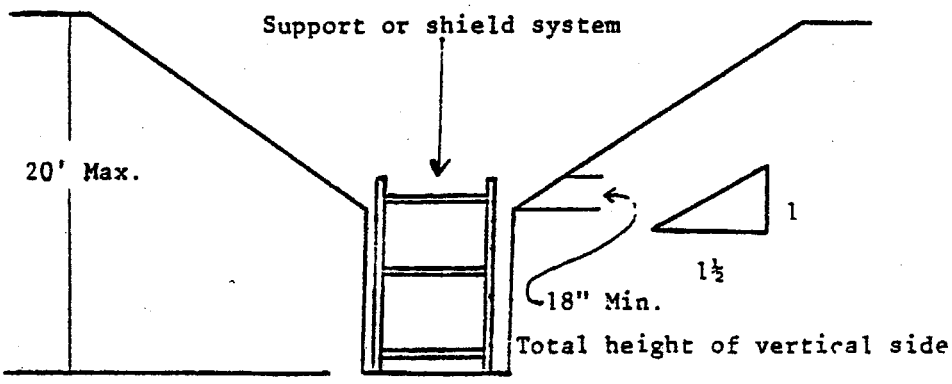
B–1.3 Excavations Made in Type C Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1½:1.



SIMPLE SLOPE

2. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1½:1.

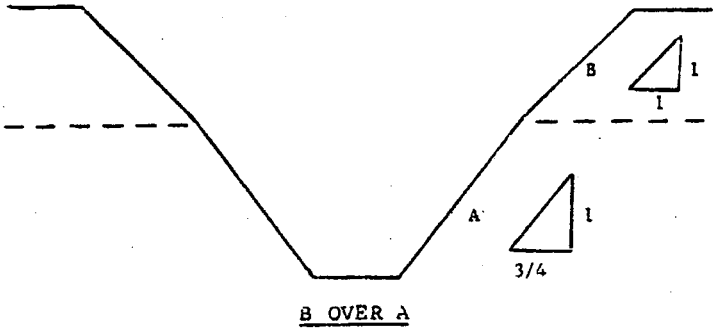


VERTICAL SIDED LOWER PORTION

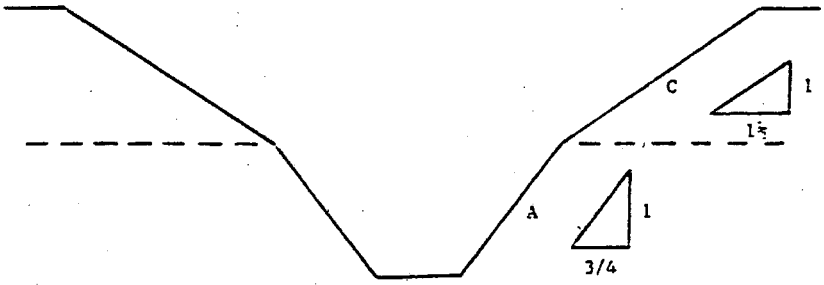
3. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

B–1.4 Excavations Made in Layered Soils

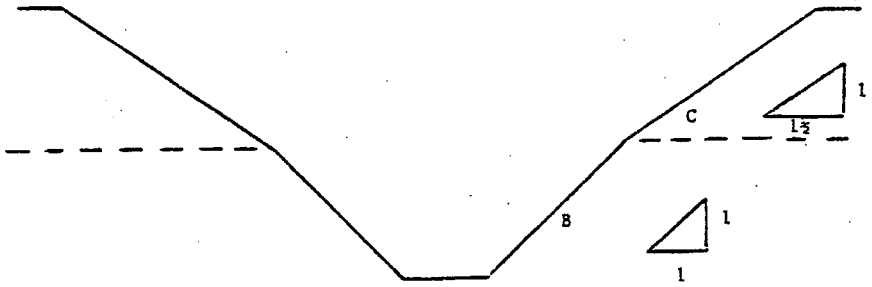
1. All excavations 20 feet or less in depth made in layered soils shall have a maximum allowable slope for each layer as set forth below.



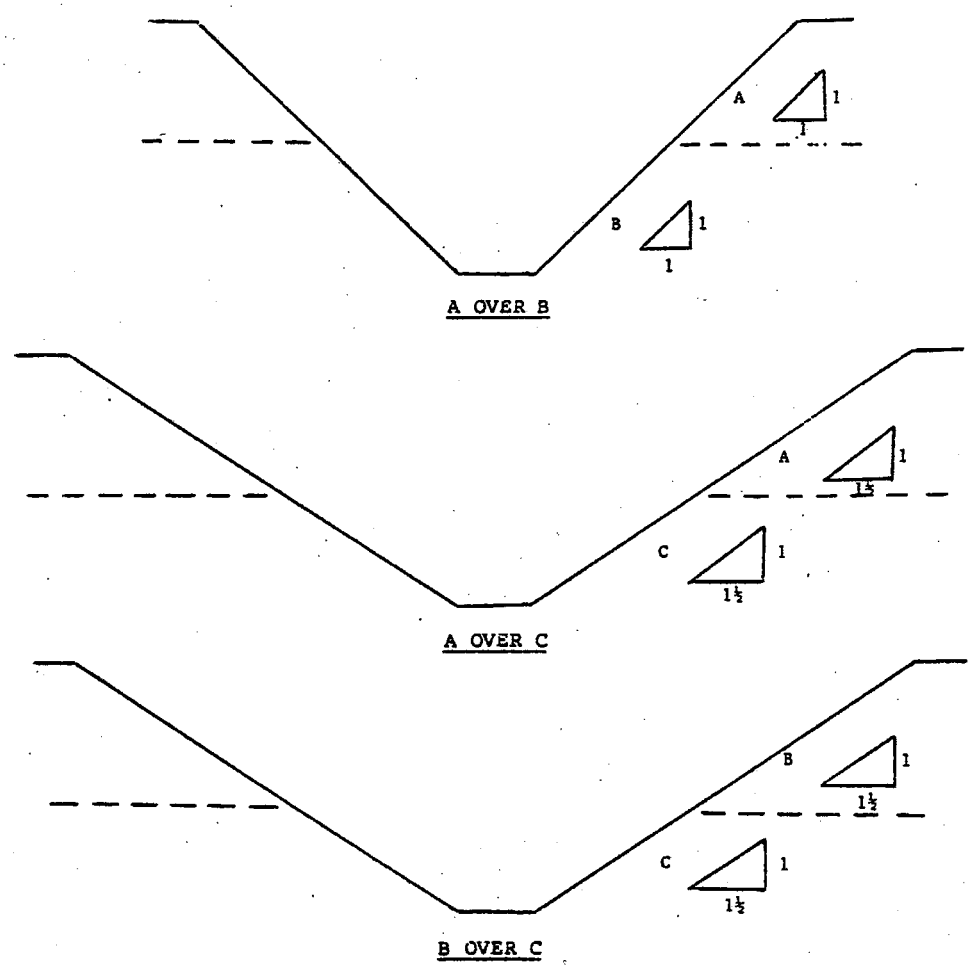
B OVER A



C OVER A



C OVER B



2. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

APPENDIX C TO SUBPART P OF PART 1926—TIMBER SHORING FOR TRENCHES

(a) *Scope.* This appendix contains information that can be used timber shoring is provided as a method of protection from caveins in trenches that do not exceed 20 feet (6.1 m) in depth. This appendix must be used when design of timber shoring protective systems is to be performed in accordance with §1926.652(c)(1). Other timber shoring configurations; other systems of support such as hydraulic and pneumatic systems; and other protective systems such as sloping, benching, shielding, and freezing systems must be designed in accordance with the requirements set forth in §1926.652(b) and §1926.652(c).

(b) *Soil Classification.* In order to use the data presented in this appendix, the soil type or types in which the excavation is made must first be determined using the soil classification method set forth in appendix A of subpart P of this part.

(c) *Presentation of Information.* Information is presented in several forms as follows:

(1) Information is presented in tabular form in Tables C–1.1, C–1.2, and C–1.3, and Tables C–2.1, C–2.2 and C–2.3 following paragraph (g) of the appendix. Each table presents the minimum sizes of timber members to use in a shoring system, and each table contains data only for the particular soil type in which the excavation or portion of

the excavation is made. The data are arranged to allow the user the flexibility to select from among several acceptable configurations of members based on varying the horizontal spacing of the crossbraces. Stable rock is exempt from shoring requirements and therefore, no data are presented for this condition.

(2) Information concerning the basis of the tabular data and the limitations of the data is presented in paragraph (d) of this appendix, and on the tables themselves.

(3) Information explaining the use of the tabular data is presented in paragraph (e) of this appendix.

(4) Information illustrating the use of the tabular data is presented in paragraph (f) of this appendix.

(5) Miscellaneous notations regarding Tables C–1.1 through C–1.3 and Tables C–2.1 through C–2.3 are presented in paragraph (g) of this Appendix.

(d) *Basis and limitations of the data*—(1) *Dimensions of timber members.* (i) The sizes of the timber members listed in Tables C–1.1 through C–1.3 are taken from the National Bureau of Standards (NBS) report, "Recommended Technical Provisions for Construction Practice in Shoring and Sloping of Trenches and Excavations." In addition, where NBS did not recommend specific sizes of members, member sizes are based on an analysis of the sizes required for use by existing codes and on empirical practice.

(ii) The required dimensions of the members listed in Tables C–1.1 through C–1.3 refer to actual dimensions and not nominal dimensions of the timber. Employers wanting to use nominal size shoring are directed to Tables C–2.1 through C–2.3, or have this choice under §1926.652(c)(3), and are referred to The Corps of Engineers, The Bureau of Reclamation or data from other acceptable sources.

(2) *Limitation of application.* (i) It is not intended that the timber shoring specification apply to every situation that may be experienced in the field. These data were developed to apply to the situations that are most commonly experienced in current trenching practice. Shoring systems for use in situations that are not covered by the data in this appendix must be designed as specified in §1926.652(c).

(ii) When any of the following conditions are present, the members specified in the tables are not considered adequate. Either an alternate timber shoring system must be designed or another type of protective system designed in accordance with §1926.652.

(A) When loads imposed by structures or by stored material adjacent to the trench weigh in excess of the load imposed by a two-foot soil surcharge. The term "adjacent" as used here means the area within a horizontal distance from the edge of the trench equal to the depth of the trench.

(B) When vertical loads imposed on cross braces exceed a 240-pound gravity load distributed on a one-foot section of the center of the crossbrace.

(C) When surcharge loads are present from equipment weighing in excess of 20,000 pounds.

(D) When only the lower portion of a trench is shored and the remaining portion of the trench is sloped or benched unless: The sloped portion is sloped at an angle less steep than three horizontal to one vertical; or the members are selected from the tables for use at a depth which is determined from the top of the overall trench, and not from the toe of the sloped portion.

(e) *Use of Tables.* The members of the shoring system that are to be selected using this information are the cross braces, the uprights, and the wales, where wales are required. Minimum sizes of members are specified for use in different types of soil. There are six tables of information, two for each soil type. The soil type must first be determined in accordance with the soil classification system described in appendix A to subpart P of part 1926. Using the appropriate table, the selection of the size and spacing of the members is then made. The selection is based on the depth and width of the trench where the members are to be installed and, in most instances, the selection is also based on the horizontal spacing of the crossbraces. Instances where a choice of horizontal spacing of crossbracing is available, the horizontal spacing of the crossbraces must be chosen by the user before the size of any member can be determined. When the soil type, the width and depth of the trench, and the horizontal spacing of the crossbraces are known, the size and vertical spacing of the crossbraces, the size and vertical spacing of the wales, and the size and horizontal spacing of the uprights can be read from the appropriate table.

(f) *Examples to Illustrate the Use of Tables C–1.1 through C–1.3.*

(1) *Example 1.*

A trench dug in Type A soil is 13 feet deep and five feet wide.

From *Table C–1.1,* for acceptable arrangements of timber can be used.

Arrangement #B1

Space 4 × 4 crossbraces at six feet horizontally and four feet vertically.

Wales are not required.

Space 3 × 8 uprights at six feet horizontally. This arrangement is commonly called "skip shoring."

Arrangement #B2

Space 4 × 6 crossbraces at eight feet horizontally and four feet vertically.

Space 8 × 8 wales at four feet vertically.

Space 2 × 6 uprights at four feet horizontally.

Arrangement #B3

Space 6 × 6 crossbraces at 10 feet horizontally and four feet vertically.

Space 8 × 10 wales at four feet vertically.

Space 2 × 6 uprights at five feet horizontally.

Arrangement #B4

Space 6 × 6 crossbraces at 12 feet horizontally and four feet vertically.

Space 10 × 10 wales at four feet vertically.

Spaces 3 × 8 uprights at six feet horizontally.

(2) *Example 2.*

A trench dug in Type B soil in 13 feet deep and five feet wide. From Table C–1.2 three acceptable arrangements of members are listed.

Arrangement #B1

Space 6 × 6 crossbraces at six feet horizontally and five feet vertically.

Space 8 × 8 wales at five feet vertically.

Space 2 × 6 uprights at two feet horizontally.

Arrangement #B2

Space 6 × 8 crossbraces at eight feet horizontally and five feet vertically.

Space 10 × 10 wales at five feet vertically.

Space 2 × 6 uprights at two feet horizontally.

Arrangement #B3

Space 8 × 8 crossbraces at 10 feet horizontally and five feet vertically.

Space 10 × 12 wales at five feet vertically.

Space 2 × 6 uprights at two feet vertically.

(3) *Example 3.*

A trench dug in Type C soil is 13 feet deep and five feet wide.

From Table C–1.3 two acceptable arrangements of members can be used.

Arrangement #B1

Space 8 × 8 crossbraces at six feet horizontally and five feet vertically.

Space 10 × 12 wales at five feet vertically.

Position 2 × 6 uprights as closely together as possible.

If water must be retained use special tongue and groove uprights to form tight sheeting.

Arrangement #B2

Space 8 × 10 crossbraces at eight feet horizontally and five feet vertically.

Space 12 × 12 wales at five feet vertically.

Position 2 × 6 uprights in a close sheeting configuration unless water pressure must be resisted. Tight sheeting must be used where water must be retained.

(4) *Example 4.*

A trench dug in Type C soil is 20 feet deep and 11 feet wide. The size and spacing of members for the section of trench that is over 15 feet in depth is determined using Table C–1.3. Only one arrangement of members is provided.

Space 8 × 10 crossbraces at six feet horizontally and five feet vertically.

Space 12 × 12 wales at five feet vertically.

Use 3 × 6 tight sheeting.

Use of Tables C–2.1 through C–2.3 would follow the same procedures.

(g) *Notes for all Tables.*

1. Member sizes at spacings other than indicated are to be determined as specified in §1926.652(c), "Design of Protective Systems."

2. When conditions are saturated or submerged use Tight Sheeting. Tight Sheeting refers to the use of specially-edged timber planks (e.g., tongue and groove) at least three inches thick, steel sheet piling, or similar construction that when driven or placed in position provide a tight wall to resist the lateral pressure of water and to prevent the loss of backfill material. Close Sheeting refers to the placement of planks side-by-side allowing as little space as possible between them.

3. All spacing indicated is measured center to center.

4. Wales to be installed with greater dimension horizontal.

5. If the vertical distance from the center of the lowest crossbrace to the bottom of the trench exceeds two and one-half feet, uprights shall be firmly embedded or a mudsill shall be used. Where uprights are embedded, the vertical distance from the center of the lowest crossbrace to the bottom of the trench shall not exceed 36 inches. When mudsills are used, the vertical distance shall not exceed 42 inches. Mudsills are wales that are installed at the toe of the trench side.

6. Trench jacks may be used in lieu of or in combination with timber crossbraces.

7. Placement of crossbraces. When the vertical spacing of crossbraces is four feet, place the top crossbrace no more than two feet below the top of the trench. When the vertical spacing of crossbraces is five feet, place the top crossbrace no more than 2.5 feet below the top of the trench.

TABLE C-1.1

TIMBER TRENCH SHORING -- MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE A P_a = 25 X H + 72 psf (2 ft Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS **													
	CROSS BRACES							WALES		UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE	4	5	6	8
5 TO 10	UP TO 6	4X4	4X4	4X6	6X6	6X6	4	Not Req'd	---				2X6	
	UP TO 8	4X4	4X4	4X6	6X6	6X6	4	Not Req'd	---					2X8
	UP TO 10	4X6	4X6	4X6	6X6	6X6	4	8X8	4			2X6		
	UP TO 12	4X6	4X6	6X6	6X6	6X6	4	8X8	4				2X6	
10 TO 15	UP TO 6	4X4	4X4	4X6	6X6	6X6	4	Not Req'd	---				3X8	
	UP TO 8	4X6	4X6	6X6	6X6	6X6	4	8X8	4		2X6			
	UP TO 10	6X6	6X5	6X6	6X8	6X8	4	8X10	4			2X6		
	UP TO 12	6X6	6X6	6X6	6X8	6X8	4	10X10	4				3X8	
15 TO 20	UP TO 6	6X6	6X6	6X6	6X8	6X8	4	6X8	4	3X6				
	UP TO 8	6X6	6X6	6X6	6X8	6X8	4	8X8	4	3X6				
	UP TO 10	8X8	8X8	8X8	8X8	8X10	4	8X10	4	3X6				
	UP TO 12	8X8	8X8	8X8	8X8	8X10	4	10X10	4	3X6				
OVER 20	SEE NOTE 1													

* Mixed oak or equivalent with a bending strength not less than 850 psi.
** Manufactured members of equivalent strength may by substituted for wood.

TABLE C-1.2

TIMBER TRENCH SHORING -- MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE B P_a = 45 X H + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS**													
	CROSS BRACES						WALES		UPRIGHTS					
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE	2	3		
5 TO 10	UP TO 6	4X6	4X6	6X6	6X6	6X6	5	6X8	5			2X6		
	UP TO 8	6X6	6X6	6X6	6X8	6X8	5	8X10	5			2X6		
	UP TO 10	6X6	6X6	6X6	6X8	6X8	5	10X10	5			2X6		
	See Note 1													
10 TO 15	UP TO 6	6X6	6X6	6X6	6X8	6X8	5	8X8	5		2X6			
	UP TO 8	6X8	6X8	6X8	8X8	8X8	5	10X10	5		2X6			
	UP TO 10	8X8	8X8	8X8	8X8	8X10	5	10X12	5		2X6			
	See Note 1													
15 TO 20	UP TO 6	6X8	6X8	6X8	8X8	8X8	5	8X10	5	3X6				
	UP TO 8	8X8	8X8	8X8	8X8	8X10	5	10X12	5	3X6				
	UP TO 10	8X10	8X10	8X10	8X10	10X10	5	12X12	5	3X6				
	See Note 1													
OVER 20	SEE NOTE 1													

* Mixed oak or equivalent with a bending strength not less than 850 psi.
** Manufactured members of equivalent strength may by substituted for wood.

TABLE C-1.3

TIMBER TRENCH SHORING -- MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE C P_a = 80 X H + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS**														
	CROSS BRACES								UPRIGHTS						
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN.)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET) (See Note 2)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE				
5 TO 10	UP TO 6	6X8	6X8	6X8	8X8	8X8	5	8X10	5	2X6				
	UP TO 8	8X8	8X8	8X8	8X8	8X10	5	10X12	5	2X6				
	UP TO 10	8X10	8X10	8X10	8X10	10X10	5	12X12	5	2X6				
	See Note 1													
10 TO 15	UP TO 6	8X8	8X8	8X8	8X8	8X10	5	10X12	5	2X6				
	UP TO 8	8X10	8X10	8X10	8X10	10X10	5	12X12	5	2X6				
	See Note 1													
	See Note 1													
15 TO 20	UP TO 6	8X10	8X10	8X10	8X10	10X10	5	12X12	5	3X6				
	See Note 1													
	See Note 1													
	See Note 1													
OVER 20	SEE NOTE 1													

* Mixed Oak or equivalent with a bending strength not less than 850 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE C-2.1

TIMBER TRENCH SHORING -- MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE A P_a = 25 X H ± 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (S4S) AND SPACING OF MEMBERS **													
	CROSS BRACES							WALES		UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE	4	5	6	8
5 TO 10	UP TO 6	4X4	4X4	4X4	4X4	4X6	4	Not Req'd	Not Req'd				4X6	
	UP TO 8	4X4	4X4	4X4	4X6	4X6	4	Not Req'd	Not Req'd					4X8
	UP TO 10	4X6	4X6	4X6	6X6	6X6	4	8X8	4			4X6		
	UP TO 12	4X6	4X6	4X6	6X6	6X6	4	8X8	4				4X6	
10 TO 15	UP TO 6	4X4	4X4	4X4	6X6	6X6	4	Not Req'd	Not Req'd				4X10	
	UP TO 8	4X6	4X6	4X6	6X6	6X6	4	6X8	4		4X6			
	UP TO 10	6X6	6X6	6X6	6X6	6X6	4	8X8	4			4X8		
	UP TO 12	6X6	6X6	6X6	6X6	6X6	4	8X10	4		4X6		4X10	
15 TO 20	UP TO 6	6X6	6X6	6X6	6X6	6X6	4	6X8	4	3X6				
	UP TO 8	6X6	6X6	6X6	6X6	6X6	4	8X8	4	3X6	4X12			
	UP TO 10	6X6	6X6	6X6	6X6	6X8	4	8X10	4	3X6				
	UP TO 12	6X6	6X6	6X6	6X8	6X8	4	8X12	4	3X6	4X12			
OVER 20	SEE NOTE 1													

* Douglas fir or equivalent with a bending strength not less than 1500 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE C-2.2

TIMBER TRENCH SHORING -- MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE B P_a = 45 X H + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (S4S) AND SPACING OF MEMBERS **													
	CROSS BRACES						WALES		UPRIGHTS					
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN.)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE	2	3	4	6
5 TO 10	UP TO 6	4X6	4X6	4X6	6X6	6X6	5	6X8	5			3X12 4X8		4X12
	UP TO 8	4X6	4X6	6X6	6X6	6X6	5	8X8	5		3X8		4X8	
	UP TO 10	4X6	4X6	6X6	6X6	6X8	5	8X10	5			4X8		
	See Note 1													
10 TO 15	UP TO 6	6X6	6X6	6X6	6X8	6X8	5	8X8	5	3X6	4X10			
	UP TO 8	6X8	6X8	6X8	8X8	8X8	5	10X10	5	3X6	4X10			
	UP TO 10	6X8	6X8	8X8	8X8	8X8	5	10X12	5	3X6	4X10			
	See Note 1													
15 TO 20	UP TO 6	6X8	6X8	6X8	6X8	8X8	5	8X10	5	4X6				
	UP TO 8	6X8	6X8	6X8	8X8	8X8	5	10X12	5	4X6				
	UP TO 10	8X8	8X8	8X8	8X8	8X8	5	12X12	5	4X6				
	See Note 1													
OVER 20	SEE NOTE 1													

* Douglas fir or equivalent with a bending strength not less than 1500 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE C-2.3

TIMBER TRENCH SHORING — MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE C P_a = 80 X H + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (S4S) AND SPACING OF MEMBERS **															
	CROSS BRACES								WALES			UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)						VERT. SPACING (FEET)	SIZE (TM)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)					
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15					CLOSE					
5 TO 10	UP TO 6	6X6	6X6	6X6	6X6	8X8	5	8X8	5	3X6						
	UP TO 8	6X6	6X6	6X6	8X8	8X8	5	10X10	5	3X6						
	UP TO 10	6X6	6X6	8X8	8X8	8X8	5	10X12	5	3X6						
	See Note 1															
10 TO 15	UP TO 6	6X8	6X8	6X8	8X8	8X8	5	10X10	5	4X6						
	UP TO 8	8X8	8X8	8X8	8X8	8X8	5	12X12	5	4X6						
	See Note 1															
	See Note 1															
15 TO 20	UP TO 6	8X8	8X8	8X8	8X10	8X10	5	10X12	5	4X6						
	See Note 1															
	See Note 1															
	See Note 1															
OVER 20	SEE NOTE 1															

* Douglas fir or equivalent with a bending strength not less than 1500 psi.

** Manufactured members of equivalent strength may be substituted for wood.

APPENDIX D TO SUBPART P OF PART 1926—ALUMINUM HYDRAULIC SHORING FOR TRENCHES

(a) *Scope.* This appendix contains information that can be used when aluminum hydraulic shoring is provided as a method of protection against cave-ins in trenches that do not exceed 20 feet (6.1m) in depth. This appendix must be used when design of the aluminum hydraulic protective system cannot be performed in accordance with §1926.652(c)(2).

(b) *Soil Classification.* In order to use data presented in this appendix, the soil type or types in which the excavation is made must

first be determined using the soil classification method set forth in appendix A of subpart P of part 1926.

(c) *Presentation of Information.* Information is presented in several forms as follows:

(1) Information is presented in tabular form in Tables D–1.1, D–1.2, D–1.3 and E–1.4. Each table presents the maximum vertical and horizontal spacings that may be used with various aluminum member sizes and various hydraulic cylinder sizes. Each table contains data only for the particular soil type in which the excavation or portion of the excavation is made. Tables D–1.1 and D–1.2 are for vertical shores in Types A and B soil. Tables D–1.3 and D1.4 are for horizontal waler systems in Types B and C soil.

(2) Information concerning the basis of the tabular data and the limitations of the data is presented in paragraph (d) of this appendix.

(3) Information explaining the use of the tabular data is presented in paragraph (e) of this appendix.

(4) Information illustrating the use of the tabular data is presented in paragraph (f) of this appendix.

(5) Miscellaneous notations (footnotes) regarding Table D–1.1 through D–1.4 are presented in paragraph (g) of this appendix.

(6) Figures, illustrating typical installations of hydraulic shoring, are included just prior to the Tables. The illustrations page is entitled "Aluminum Hydraulic Shoring; Typical Installations."

(d) *Basis and limitations of the data.* (1) Vertical shore rails and horizontal wales are those that meet the Section Modulus requirements in the D–1 Tables. Aluminum material is 6061–T6 or material of equivalent strength and properties.

(2) Hydraulic cylinders specifications. (i) 2-inch cylinders shall be a minimum 2-inch inside diameter with a minimum safe working capacity of no less than 18,000 pounds axial compressive load at maximum extension. Maximum extension is to include full range of cylinder extensions as recommended by product manufaturer.

(ii) 3-inch cylinders shall be a minimum 3-inch inside diameter with a safe working capacity of not less than 30,000 pounds axial compressive load at extensions as recommended by product manufacturer.

(3) Limitation of application.

(i) It is not intended that the aluminum hydraulic specification apply to every situation that may be experienced in the field. These data were developed to apply to the situations that are most commonly experienced in current trenching practice. Shoring systems for use in situations that are not covered by the data in this appendix must be otherwise designed as specified in §1926.652(c).

(ii) When any of the following conditions are present, the members specified in the Tables are not considered adequate. In this case, an alternative aluminum hydraulic shoring system or other type of protective system must be designed in accordance with §1926.652.

(A) When vertical loads imposed on cross braces exceed a 100 Pound gravity load distributed on a one foot section of the center of the hydraulic cylinder.

(B) When surcharge loads are present from equipment weighing in excess of 20,000 pounds.

(C) When only the lower portion or a trench is shored and the remaining portion of the trench is sloped or benched unless: The sloped portion is sloped at an angle less steep than three horizontal to one vertical; or the members are selected from the tables for use at a depth which is determined from the top of the overall trench, and not from the toe of the sloped portion.

(e) *Use of Tables D–1.1, D–1.2, D–1.3 and D–1.4.* The members of the shoring system that are to be selected using this information are the hydraulic cylinders, and either the vertical shores or the horizontal wales. When a waler system is used the vertical timber sheeting to be used is also selected from these tables. The Tables D–1.1 and D–1.2 for vertical shores are used in Type A and B soils that do not require sheeting. Type B soils that may require sheeting, and Type C soils that always require sheeting are found in the horizontal wale Tables D–1.3 and D–1.4. The soil type must first be determined in accordance with the soil classification system described in appendix A to subpart P of part 1926. Using the appropriate table, the selection of the size and spacing of the members is made. The selection is based on the depth and width of the trench where the members are to be installed. In these tables the vertical spacing is held constant at four feet on center. The tables show the maximum horizontal spacing of cylinders allowed for each size of wale in the waler system tables, and in the vertical shore tables, the hydraulic cylinder horizontal spacing is the same as the vertical shore spacing.

(f) *Example to Illustrate the Use of the Tables:*

(1) Example 1:

A trench dug in Type A soil is 6 feet deep and 3 feet wide. From Table D–1.1: Find vertical shores and 2 inch diameter cylinders spaced 8 feet on center (o.c.) horizontally and 4 feet on center (o.c.) vertically. (See Figures 1 & 3 for typical installations.)

(2) Example 2:

A trench is dug in Type B soil that does not require sheeting, 13 feet deep and 5 feet wide. From Table D–1.2: Find vertical shores and 2 inch diameter cylinders spaced 6.5 feet o.c. horizontally and 4 feet o.c. vertically. (See Figures 1 & 3 for typical installations.)

(3) A trench is dug in Type B soil that does not require sheeting, but does experience some minor raveling of the trench face. The

trench is 16 feet deep and 9 feet wide. From Table D–1.2: Find vertical shores and 2 inch diameter cylinder (with special oversleeves as designated by footnote #B2) spaced 5.5 feet o.c. horizontally and 4 feet o.c. vertically, plywood (per footnote (g)(7) to the D–1 Table) should be used behind the shores. (See Figures 2 & 3 for typical installations.)

(4) Example 4: A trench is dug in previously disturbed Type B soil, with characteristics of a Type C soil, and will require sheeting. The trench is 18 feet deep and 12 feet wide. 8 foot horizontal spacing between cylinders is desired for working space. From Table D–1.3: Find horizontal wale with a section modulus of 14.0 spaced at 4 feet o.c. vertically and 3 inch diameter cylinder spaced at 9 feet maximum o.c. horizontally. 3 × 12 timber sheeting is required at close spacing vertically. (See Figure 4 for typical installation.)

(5) Example 5: A trench is dug in Type C soil, 9 feet deep and 4 feet wide. Horizontal cylinder spacing in excess of 6 feet is desired for working space. From Table D–1.4: Find horizontal wale with a section modulus of 7.0 and 2 inch diameter cylinders spaced at 6.5 feet o.c. horizontally. Or, find horizontal wale with a 14.0 section modulus and 3 inch diameter cylinder spaced at 10 feet o.c. horizontally. Both wales are spaced 4 feet o.c. vertically. 3 × 12 timber sheeting is required at close spacing vertically. (See Figure 4 for typical installation.)

(g) *Footnotes, and general notes, for Tables D–1.1, D–1.2, D–1.3, and D–1.4.*

(1) For applications other than those listed in the tables, refer to §1926.652(c)(2) for use of manufacturer's tabulated data. For trench depths in excess of 20 feet, refer to §1926.652(c)(2) and §1926.652(c)(3).

(2) 2 inch diameter cylinders, at this width, shall have structural steel tube (3.5 × 3.5 × 0.1875) oversleeves, or structural oversleeves of manufacturer's specification, extending the full, collapsed length.

(3) Hydraulic cylinders capacities. (i) 2 inch cylinders shall be a minimum 2-inch inside diameter with a safe working capacity of not less than 18,000 pounds axial compressive load at maximum extension. Maximum extension is to include full range of cylinder extensions as recommended by product manufacturer.

(ii) 3-inch cylinders shall be a minimum 3-inch inside diameter with a safe work capacity of not less than 30,000 pounds axial compressive load at maximum extension. Maximum extension is to include full range of cylinder extensions as recommended by product manufacturer.

(4) All spacing indicated is measured center to center.

(5) Vertical shoring rails shall have a minimum section modulus of 0.40 inch.

(6) When vertical shores are used, there must be a minimum of three shores spaced equally, horizontally, in a group.

(7) Plywood shall be 1.125 in. thick softwood or 0.75 inch. thick, 14 ply, arctic white birch (Finland form). Please note that plywood is not intended as a structural member, but only for prevention of local raveling (sloughing of the trench face) between shores.

(8) See appendix C for timber specifications.

(9) Wales are calculated for simple span conditions.

(10) See appendix D, item (d), for basis and limitations of the data.

ALUMINUM HYDRAULIC SHORING
TYPICAL INSTALLATIONS

FIGURE NO. 1
VERTICAL ALUMINUM HYDRAULIC SHORING (SPOT BRACING)

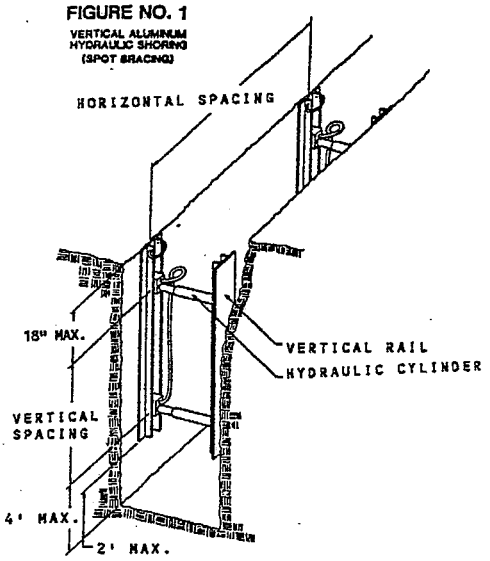


FIGURE NO. 2
VERTICAL ALUMINUM HYDRAULIC SHORING (WITH PLYWOOD)

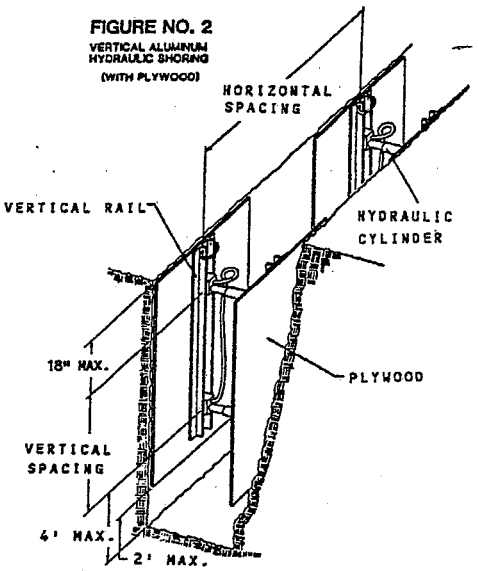


FIGURE NO. 3
VERTICAL ALUMINUM HYDRAULIC SHORING (STACKED)

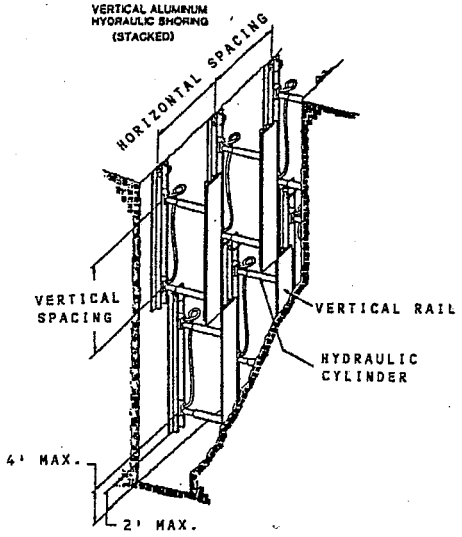


FIGURE NO. 4
ALUMINUM HYDRAULIC SHORING WALER SYSTEM (TYPICAL)

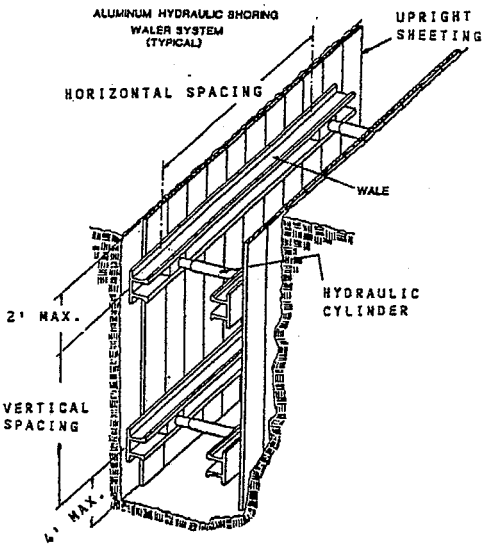


TABLE D - 1.1
ALUMINUM HYDRAULIC SHORING
VERTICAL SHORES
FOR SOIL TYPE A

DEPTH OF TRENCH (FEET)	HYDRAULIC CYLINDERS				
	MAXIMUM HORIZONTAL SPACING (FEET)	MAXIMUM VERTICAL SPACING (FEET)	WIDTH OF TRENCH (FEET)		
			UP TO 8	OVER 8 UP TO 12	OVER 12 UP TO 15
OVER 5 UP TO 10	8	4	2 INCH DIAMETER	2 INCH DIAMETER NOTE (2)	3 INCH DIAMETER
OVER 10 UP TO 15	8				
OVER 15 UP TO 20	7				
OVER 20	NOTE (1)				

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)
Note (1): See Appendix D, Item (g) (1)
Note (2): See Appendix D, Item (g) (2)

TABLE D - 1.2
ALUMINUM HYDRAULIC SHORING
VERTICAL SHORES
FOR SOIL TYPE B

DEPTH OF TRENCH (FEET)	HYDRAULIC CYLINDERS				
	MAXIMUM HORIZONTAL SPACING (FEET)	MAXIMUM VERTICAL SPACING (FEET)	WIDTH OF TRENCH (FEET)		
			UP TO 8	OVER 8 UP TO 12	OVER 12 UP TO 15
OVER 5 UP TO 10	8	4	2 INCH DIAMETER	2 INCH DIAMETER NOTE (2)	3 INCH DIAMETER
OVER 10 UP TO 15	6.5				
OVER 15 UP TO 20	5.5				
OVER 20	NOTE (1)				

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)
Note (1): See Appendix D, Item (g) (1)
Note (2): See Appendix D, Item (g) (2)

TABLE D - 1.3
ALUMINUM HYDRAULIC SHORING
WALER SYSTEMS
FOR SOIL TYPE B

DEPTH OF TRENCH (FEET)	WALES		HYDRAULIC CYLINDERS						TIMBER UPRIGHTS		
	VERTICAL SPACING (FEET)	* SECTION MODULUS (IN^3)	WIDTH OF TRENCH (FEET)						MAX.HORIZ.SPACING (ON CENTER)		
			UP TO 8		OVER 8 UP TO 12		OVER 12 UP TO15		SOLID SHEET	2 FT.	3 FT.
			HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. SPACING	CYLINDER DIAMETER			
OVER 5 UP TO 10	4	3.5	8.0	2 IN	8.0	2 IN NOTE(2)	8.0	3 IN	—	—	3x12
		7.0	9.0	2 IN	9.0	2 IN NOTE(2)	9.0	3 IN			
		14.0	12.0	3 IN	12.0	3 IN	12.0	3 IN			
OVER 10 UP TO 15	4	3.5	6.0	2 IN	6.0	2 IN NOTE(2)	6.0	3 IN	—	3x12	—
		7.0	8.0	3 IN	8.0	3 IN	8.0	3 IN			
		14.0	10.0	3 IN	10.0	3 IN	10.0	3 IN			
OVER 15 UP TO 20	4	3.5	5.5	2 IN	5.5	2 IN NOTE(2)	5.5	3 IN	3x12	—	—
		7.0	6.0	3 IN	6.0	3 IN	6.0	3 IN			
		14.0	9.0	3 IN	9.0	3 IN	9.0	3 IN			
OVER 20	NOTE (1)										

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)
Notes (1): See Appendix D, item (g) (1)
Notes (2): See Appendix D, Item (g) (2)
* Consult product manufacturer and/or qualified engineer for Section Modulus of available wales.

TABLE D - 1.4
ALUMINUM HYDRAULIC SHORING
WALER SYSTEMS
FOR SOIL TYPE C

DEPTH OF TRENCH (FEET)	WALES		HYDRAULIC CYLINDERS						TIMBER UPRIGHTS		
			WIDTH OF TRENCH (FEET)						MAX.HORIZ SPACING (ON CENTER)		
	VERTICAL SPACING (FEET)	* SECTION MODULUS (IN^3)	UP TO 8		OVER 8 UP TO 12		OVER 12 UP TO 15		SOLID SHEET	2 FT.	3 FT.
			HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. SPACING	CYLINDER DIAMETER			
OVER 5 UP TO 10	4	3.5	6.0	2 IN	6.0	2 IN NOTE(2)	6.0	3 IN	3x12	—	—
		7.0	6.5	2 IN	6.5	2 IN NOTE(2)	6.5	3 IN			
		14.0	10.0	3 IN	10.0	3 IN	10.0	3 IN			
OVER 10 UP TO 15	4	3.5	4.0	2 IN	4.0	2 IN NOTE(2)	4.0	3 IN	3x12	—	—
		7.0	5.5	3 IN	5.5	3 IN	5.5	3 IN			
		14.0	8.0	3 IN	8.0	3 IN	8.0	3 IN			
OVER 15 UP TO 20	4	3.5	3.5	2 IN	3.5	2 IN NOTE(2)	3.5	3 IN	3x12	—	—
		7.0	5.0	3 IN	5.0	3 IN	5.0	3 IN			
		14.0	6.0	3 IN	6.0	3 IN	6.0	3 IN			
OVER 20	NOTE (1)										

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)
Notes (1): See Appendix D, item (g) (1)
Notes (2): See Appendix D, Item (g) (2)
* Consult product manufacturer and/or qualified engineer for Section Modulus of available wales.

APPENDIX E TO SUBPART P OF PART 1926—ALTERNATIVES TO TIMBER SHORING

Figure 1. Aluminum Hydraulic Shoring

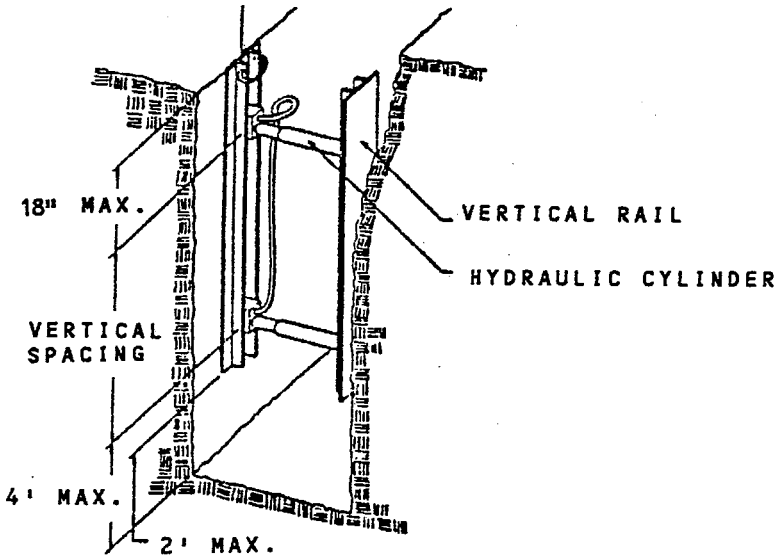


Figure 2. Pneumatic/hydraulic Shoring

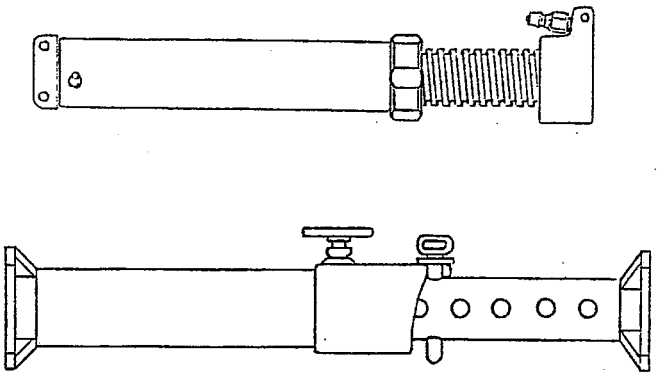


Figure 3. Trench Jacks (Screw Jacks)

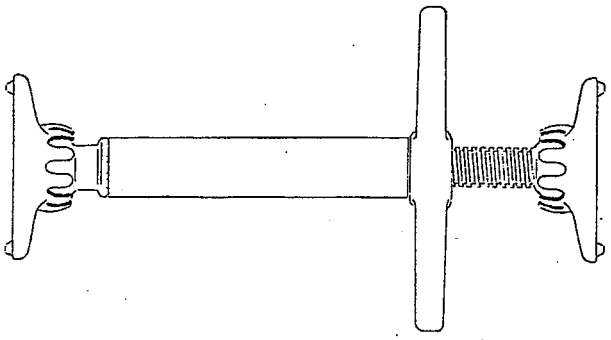
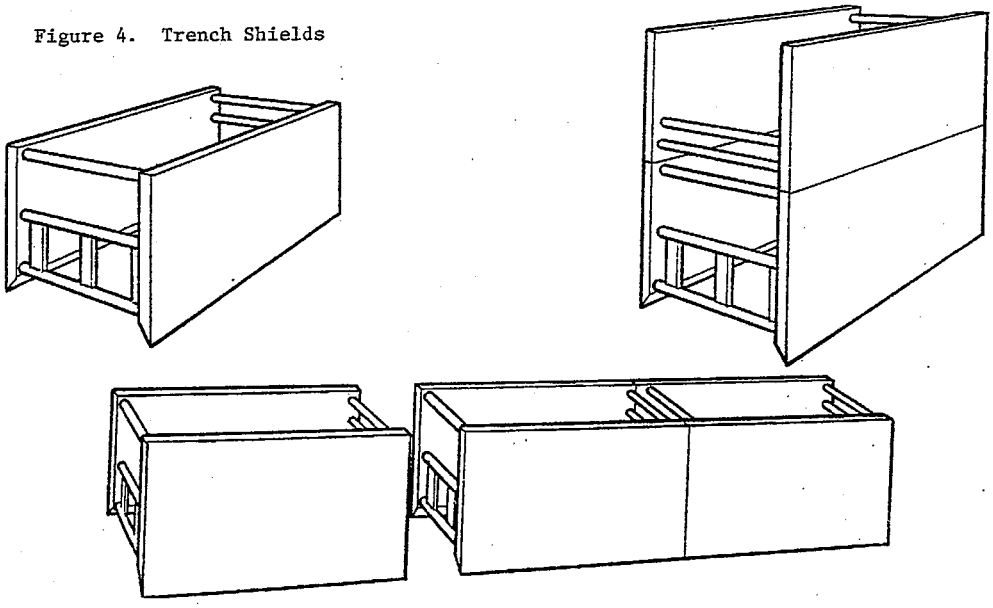


Figure 4. Trench Shields



APPENDIX F TO SUBPART P OF PART 1926—SELECTION OF PROTECTIVE SYSTEMS

The following figures are a graphic summary of the requirements contained in subpart P for excavations 20 feet or less in depth. Protective systems for use in excavations more than 20 feet in depth must be designed by a registered professional engineer in accordance with §1926.652 (b) and (c).

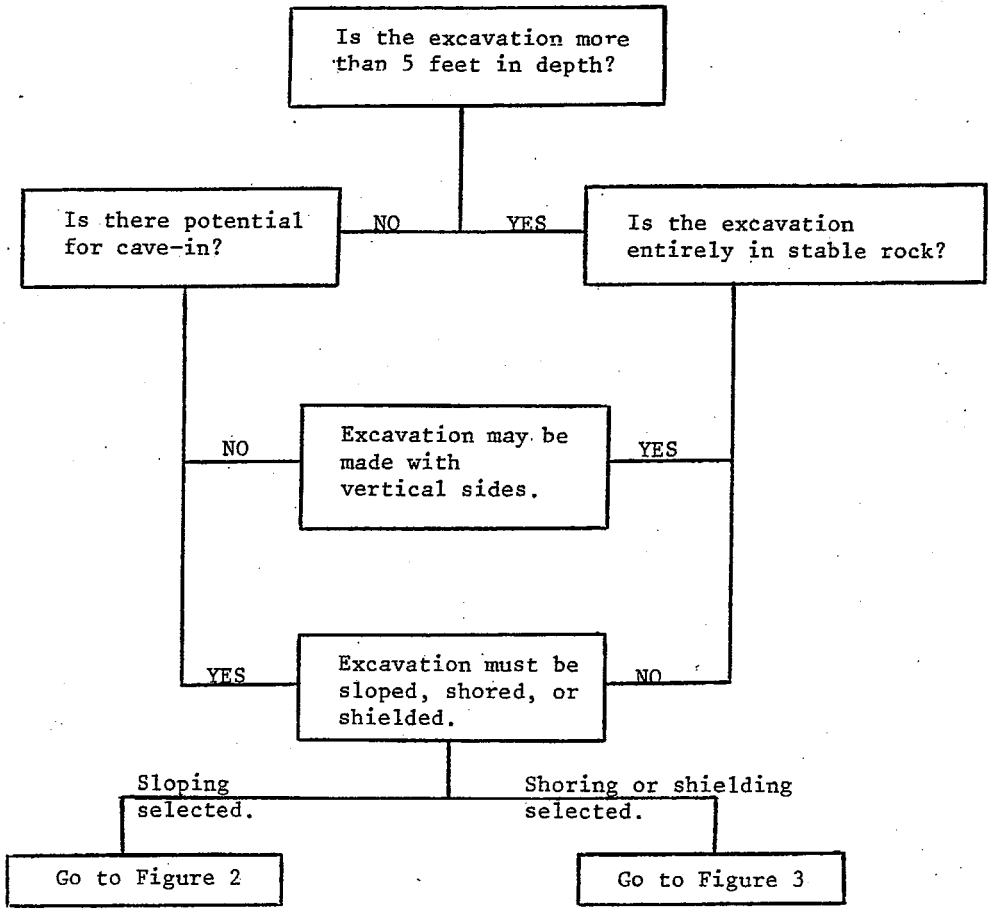


FIGURE 1 - PRELIMINARY DECISIONS

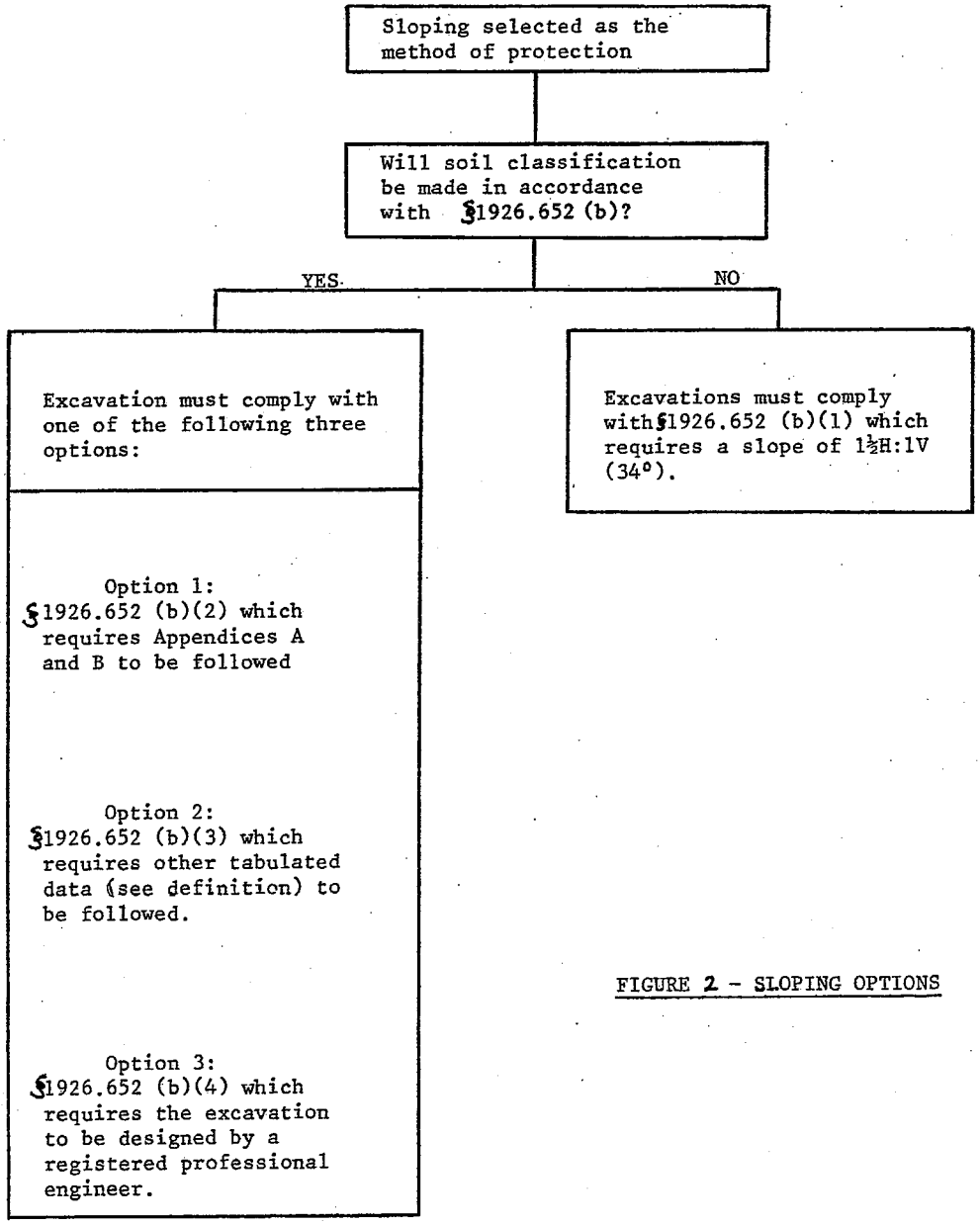


FIGURE 2 - SLOPING OPTIONS

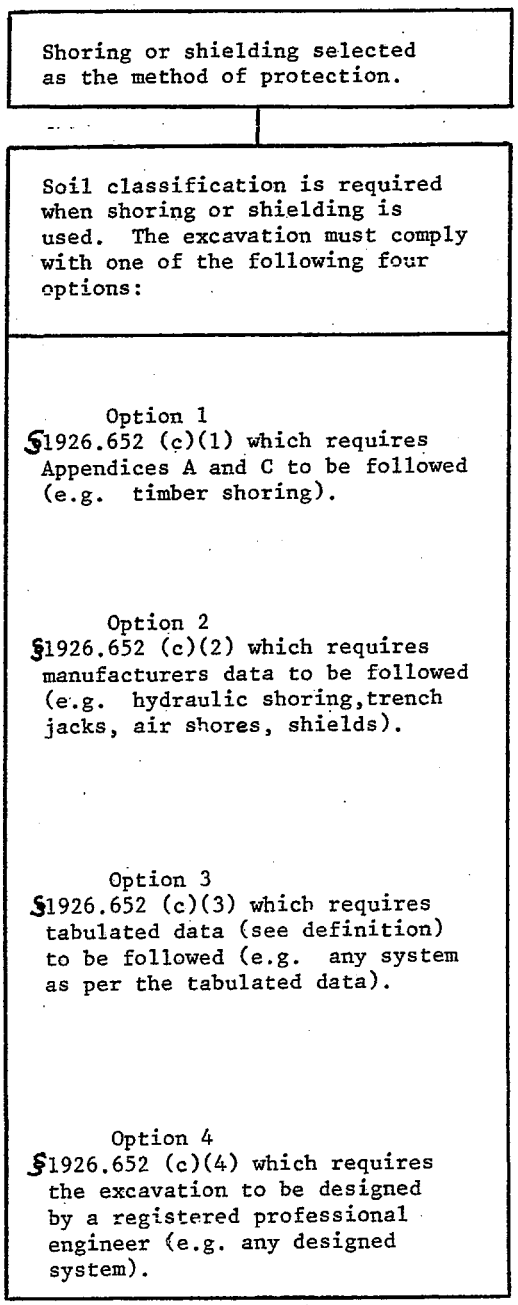


FIGURE 3 - SHORING AND SHIELDING OPTIONS

Wage Rate Requirements
Section 00 73 43 / Rev: August 2021

AR20230021 and AR20230048

A) The Contractor agrees to pay all prevailing hourly wage rates as mandated by the Davis-Bacon Wage Rates and any other applicable Federal Regulations. See attached Wage Rates.

B) The Contractor is responsible for completing and returning any reports or forms mandated by the applicable federal regulations from the U.S. Department of Labor. See attached reference.

"General Decision Number: AR20230021 01/06/2023

Superseded General Decision Number: AR20220021

State: Arkansas

Construction Type: Building
BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Counties: Clay, Cross, Fulton and Jackson Counties in Arkansas.

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least $16.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2023.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least $12.15 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2023.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/06/2023

ENGI0624-006 01/01/2017

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Crane	$ 26.20	12.30
Forklift	$ 26.20	12.30

IRON0321-010 03/01/2022

	Rates	Fringes
IRONWORKER, STRUCTURAL	$ 23.50	19.96

PAIN0424-008 07/01/2021

	Rates	Fringes
PAINTER (Spray)	$ 16.25	10.42

SHEE0036-035 06/01/2021

	Rates	Fringes
SHEET METAL WORKER (HVAC Duct Installation Only)	$ 24.44	13.66

SUAR2015-018 01/09/2017

	Rates	Fringes
BRICKLAYER	$ 19.15	0.00
CARPENTER, Includes Drywall Hanging	$ 17.20	0.00

CEMENT MASON/CONCRETE FINISHER...$ 21.08 0.00

ELECTRICIAN.....$ 21.95 6.36

LABORER: Common or General.....$ 11.12 ** 0.00

LABORER: Mason Tender - Brick...$ 12.32 ** 0.00

OPERATOR:
Backhoe/Excavator/Trackhoe.....$ 23.08 0.00

OPERATOR: Bulldozer.....$ 18.14 0.00

PAINTER (Brush and Roller).....$ 15.68 ** 0.00

PLUMBER.....$ 19.72 3.49

SPRINKLER FITTER (Fire
Sprinklers).....$ 21.77 2.46

TRUCK DRIVER: Dump Truck.....$ 15.00 ** 0.00

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

==========

** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 ($16.20) or 13658 ($12.15). Please see the Note at the top of the wage determination for more information.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO

is available at
https://www.dol.gov/agencies/whd/government-contracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates

the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISIO"

"General Decision Number: AR20230048 01/06/2023

Superseded General Decision Number: AR20220048

State: Arkansas

Construction Type: Heavy
HEAVY CONSTRUCTION PROJECTS (Including Water and Sewer Lines)

Counties: Clay, Cross, Fulton, Greene, Independence, Izard, Jackson, Lawrence, Lee, Mississippi, Monroe, Randolph, Sharp, St Francis, Stone, White and Woodruff Counties in Arkansas.

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least $16.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2023.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least $12.15 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2023.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/06/2023

SUAR2015-045 01/09/2017

	Rates	Fringes
CARPENTER, Includes Form Work	$ 17.32	3.15
LABORER: Common or General	$ 11.86 **	2.19
LABORER: Pipelayer	$ 12.19 **	1.71
OPERATOR: Backhoe/Excavator/Trackhoe	$ 18.27	2.50
OPERATOR: Bulldozer	$ 20.60	0.00
TRUCK DRIVER: Dump Truck	$ 16.13 **	1.93

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 ($16.20) or 13658 ($12.15). Please see the Note at the top of the wage determination for more information.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year.

Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

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Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

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200 Constitution Avenue, N.W.
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The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISIO"

Contract and Grant Disclosure and Certification Form

Failure to complete all of the following information may result in a delay in obtaining a contract, lease, purchase agreement, or grant award with any Arkansas State Agency

Subcontractor: Subcontractor Name:

☐ **Yes** ☐ **No**

Taxpayer ID Name: Is This For: ☐ **Goods?** ☐ **Services?** ☐ **Both?**

Your Last Name: First Name: M.I.

Address:

City: State: Zip Code: Country:

AS A CONDITION OF OBTAINING, EXTENDING, AMENDING, OR RENEWING A CONTRACT, LEASE, PURCHASE AGREEMENT, OR GRANT AWARD WITH ANY ARKANSAS STATE AGENCY, THE FOLLOWING INFORMATION MUST BE DISCLOSED

FOR INDIVIDUALS *

Indicate below if: you, your spouse or the brother, sister, parent, or child of you or your spouse is a current or former: member of the General Assembly, Constitutional Officer, State Board or Commission Member, or State Employee:

Position Held	Mark (x)		Name of Position of Job Held (senator, representative, name of board/ commission, data entry, etc.)	For How Long?		What is the person(s) name and how they relate to you? (i.e. Jane Q. Public, Spouse, John Q. Public, Jr., child, etc.)	
	Current	Former		From MM/YY	To MM/YY	Person's Name(s)	Relation
General Assembly							
Constitutional Officer							
State Board or Commission Member							
State Employee							

☐ **None of the above applies**

FOR AN ENTITY (BUSINESS) *

Indicate below if any of the following persons, current or former, hold any position of control or hold any ownership interest of 10% or greater in the entity: member of the General Assembly, Constitutional Officer, State Board or Commission Member, State Employee, or the spouse, brother, sister, parent, or child of a member of the General Assembly, Constitutional Officer, State Board or Commission Member, or State Employee. Position of control means the power to direct the purchasing policies or influence the management of the entity.

Position Held	Mark (x)		Name of Position of Job Held (senator, representative, name of board/ commission, data entry, etc.)	For How Long?		What is the person(s) name and what is his/her % of ownership interest and/or what is his/her position of control?		
	Current	Former		From MM/YY	To MM/YY	Person's Name(s)	Ownership Interest (%)	Position of Control
General Assembly								
Constitutional Officer								
State Board or Commission Member								
State Employee								

☐ **None of the above applies**

* Note: Please list additional disclosures on separate sheet of paper if more space is needed.

Contract and Grant Disclosure and Certification Form

Failure to make any disclosure required by Governor's Executive Order 98-04, or any violation of any rule, regulation, or policy adopted pursuant to that Order, shall be a material breach of the terms of this contract. Any contractor, whether an individual or entity, who fails to make the required disclosure or who violates any rule, regulation, or policy shall be subject to all legal remedies available to the agency.

As an additional condition of obtaining, extending, amending, or renewing a contract with a state agency I agree as follows:

1. Prior to entering into any agreement with any subcontractor, prior or subsequent to the contract date, I will require the subcontractor to complete a **Contract and Grant Disclosure and Certification Form**. Subcontractor shall mean any person or entity with whom I enter an agreement whereby I assign or otherwise delegate to the person or entity, for consideration, all, or any part, of the performance required of me under the terms of my contract with the state agency.

2. I will include the following language as a part of any agreement with a subcontractor:

Failure to make any disclosure required by Governor's Executive Order 98-04, or any violation of any rule, regulation, or policy adopted pursuant to that Order, shall be a material breach of the terms of this subcontract. The party who fails to make the required disclosure or who violates any rule, regulation, or policy shall be subject to all legal remedies available to the contractor.

3. No later than ten (10) days after entering into any agreement with a subcontractor, whether prior or subsequent to the contract date, I will mail a copy of the **CONTRACT AND GRANT DISCLOSURE AND CERTIFICATION FORM** completed by the subcontractor and a statement containing the dollar amount of the subcontract to the state agency.

I certify under penalty of perjury, to the best of my knowledge and belief, all of the above information is true and correct and that I agree to the subcontractor disclosure conditions stated herein.

Signature _____ Title _____ Date _____

Vendor Contact Person _____ Title _____ Phone Number _____

Agency Use Only

Agency Number	Agency Name	Agency Contact Person	Contact Phone #	Contract or Grant Number
3852301R	Arkansas Department of Veterans Affairs	Scott Stanger	501-683-1787	3852301R

* Note: Please list additional disclosures on separate sheet of paper if more space is needed.

BIDDING ADDENDA
Section 00 91 13 / Rev: August 2021

Date:

Addendum Number:

Project Number: 3852301R

Agency Name: Arkansas Department of Veterans Affairs

The proposed contract documents for this work are modified as follows:

1 **INVITATION TO BID**

2 **SPECIFICATIONS**

3 **DRAWINGS**

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Build America, Buy America Act (BABAA)
As of 08.16.2022

Compliance by Cemeteries with the Build America, Buy America Act (BABAA) requirements in Public Law, 117-58 that the United States produce or manufacturer all iron, steel, manufactured products, and construction materials used in VA-funded projects in the U.S. is mandatory. Cemeteries must certify that they will use grant funds for projects that meet BABAA domestic content procurement preferences.

The United States must produce or manufacture all iron, steel, and construction materials used in VA-funded projects in the U.S. The United States must manufacture all products used in VA-funded project in the U.S. (cost of components of the U.S. manufactured product must be greater than 55% of the total cost of all components).

Director of the Office of Management and Budget, may, after public notice and opportunity for comment, issue regulations establishing a fee structure for sponsors of covered projects to reimburse the United States for reasonable costs incurred in conducting environmental reviews and authorizations for covered projects.";

(2) in subsection (b), by striking "and 41003" and inserting "through 41008"; and

(3) in subsection (d)—

(A) in the subsection heading, by striking "AND PERMITTING"; and

(B) by striking paragraphs (2) and (3) and inserting the following:

"(2) AVAILABILITY.—Amounts in the Fund shall be available to the Executive Director, without fiscal year limitation, solely for the purposes of administering, implementing, and enforcing this title, including the expenses of the Council, staffing of the Office of the Executive Director, and support of the role of the Council as a Federal center for permitting excellence, which may include supporting interagency detailee and rotation opportunities, advanced training, enhanced support for agency project managers, and fora for sharing information and lessons learned.

"(3) TRANSFER.—For the purpose of carrying out this title, the Executive Director, with the approval of the Director of the Office of Management and Budget, may transfer amounts in the Fund to other Federal agencies and State, Tribal, and local governments to facilitate timely and efficient environmental reviews and authorizations for covered projects and other projects under this title, including direct reimbursement agreements with agency CERPOs, reimbursable agreements, and approval and consultation processes and staff for covered projects.".

Repeal.

(h) SUNSET.—Section 41013 of the FAST Act (42 U.S.C. 4370m–12) is repealed.

(i) TECHNICAL CORRECTION.—Section 41002(b)(2)(A)(ii) of the FAST Act (42 U.S.C. 4370m–1(b)(2)(A)(ii)) is amended by striking "councilmem-ber" and inserting "councilmember".

(j) CLERICAL AMENDMENT.—The table of contents in section 1(b) of the FAST Act (Public Law 114–94; 129 Stat. 1319) is amended by striking the item relating to section 41002 and inserting the following:

"Sec. 41002. Federal Permitting Improvement Steering Council.".

TITLE IX—BUILD AMERICA, BUY AMERICA

Subtitle A—Build America, Buy America

Build America, Buy America Act.

41 USC 8301 note.

SEC. 70901. SHORT TITLE.

This subtitle may be cited as the "Build America, Buy America Act".

PART I—BUY AMERICA SOURCING REQUIREMENTS

SEC. 70911. FINDINGS.

Congress finds that—

(1) the United States must make significant investments to install, upgrade, or replace the public works infrastructure of the United States;

(2) with respect to investments in the infrastructure of the United States, taxpayers expect that their public works infrastructure will be produced in the United States by American workers;

(3) United States taxpayer dollars invested in public infrastructure should not be used to reward companies that have moved their operations, investment dollars, and jobs to foreign countries or foreign factories, particularly those that do not share or openly flout the commitments of the United States to environmental, worker, and workplace safety protections;

(4) in procuring materials for public works projects, entities using taxpayer-financed Federal assistance should give a commonsense procurement preference for the materials and products produced by companies and workers in the United States in accordance with the high ideals embodied in the environmental, worker, workplace safety, and other regulatory requirements of the United States;

(5) common construction materials used in public works infrastructure projects, including steel, iron, manufactured products, non-ferrous metals, plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables), glass (including optic glass), lumber, and drywall are not adequately covered by a domestic content procurement preference, thus limiting the impact of taxpayer purchases to enhance supply chains in the United States;

(6) the benefits of domestic content procurement preferences extend beyond economics;

(7) by incentivizing domestic manufacturing, domestic content procurement preferences reinvest tax dollars in companies and processes using the highest labor and environmental standards in the world;

(8) strong domestic content procurement preference policies act to prevent shifts in production to countries that rely on production practices that are significantly less energy efficient and far more polluting than those in the United States;

(9) for over 75 years, Buy America and other domestic content procurement preference laws have been part of the United States procurement policy, ensuring that the United States can build and rebuild the infrastructure of the United States with high-quality American-made materials;

(10) before the date of enactment of this Act, a domestic content procurement preference requirement may not apply, may apply only to a narrow scope of products and materials, or may be limited by waiver with respect to many infrastructure programs, which necessitates a review of such programs, including programs for roads, highways, and bridges, public

transportation, dams, ports, harbors, and other maritime facilities, intercity passenger and freight railroads, freight and intermodal facilities, airports, water systems, including drinking water and wastewater systems, electrical transmission facilities and systems, utilities, broadband infrastructure, and buildings and real property;

(11) Buy America laws create demand for domestically produced goods, helping to sustain and grow domestic manufacturing and the millions of jobs domestic manufacturing supports throughout product supply chains;

(12) as of the date of enactment of this Act, domestic content procurement preference policies apply to all Federal Government procurement and to various Federal-aid infrastructure programs;

(13) a robust domestic manufacturing sector is a vital component of the national security of the United States;

(14) as more manufacturing operations of the United States have moved offshore, the strength and readiness of the defense industrial base of the United States has been diminished; and

(15) domestic content procurement preference laws—

(A) are fully consistent with the international obligations of the United States; and

(B) together with the government procurements to which the laws apply, are important levers for ensuring that United States manufacturers can access the government procurement markets of the trading partners of the United States.

SEC. 70912. DEFINITIONS.

In this part:

(1) DEFICIENT PROGRAM.—The term "deficient program" means a program identified by the head of a Federal agency under section 70913(c).

(2) DOMESTIC CONTENT PROCUREMENT PREFERENCE.—The term "domestic content procurement preference" means a requirement that no amounts made available through a program for Federal financial assistance may be obligated for a project unless—

(A) all iron and steel used in the project are produced in the United States;

(B) the manufactured products used in the project are produced in the United States; or

(C) the construction materials used in the project are produced in the United States.

(3) FEDERAL AGENCY.—The term "Federal agency" means any authority of the United States that is an "agency" (as defined in section 3502 of title 44, United States Code), other than an independent regulatory agency (as defined in that section).

(4) FEDERAL FINANCIAL ASSISTANCE.—

(A) IN GENERAL.—The term "Federal financial assistance" has the meaning given the term in section 200.1 of title 2, Code of Federal Regulations (or successor regulations).

(B) INCLUSION.—The term "Federal financial assistance" includes all expenditures by a Federal agency to a non-Federal entity for an infrastructure project, except

that it does not include expenditures for assistance authorized under section 402, 403, 404, 406, 408, or 502 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5170a, 5170b, 5170c, 5172, 5174, or 5192) relating to a major disaster or emergency declared by the President under section 401 or 501, respectively, of such Act (42 U.S.C. 5170, 5191) or pre and post disaster or emergency response expenditures.

(5) INFRASTRUCTURE.—The term "infrastructure" includes, at a minimum, the structures, facilities, and equipment for, in the United States—

(A) roads, highways, and bridges;

(B) public transportation;

(C) dams, ports, harbors, and other maritime facilities;

(D) intercity passenger and freight railroads;

(E) freight and intermodal facilities;

(F) airports;

(G) water systems, including drinking water and wastewater systems;

(H) electrical transmission facilities and systems;

(I) utilities;

(J) broadband infrastructure; and

(K) buildings and real property.

(6) PRODUCED IN THE UNITED STATES.—The term "produced in the United States" means—

(A) in the case of iron or steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;

(B) in the case of manufactured products, that—

(i) the manufactured product was manufactured in the United States; and

(ii) the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation; and

(C) in the case of construction materials, that all manufacturing processes for the construction material occurred in the United States.

(7) PROJECT.—The term "project" means the construction, alteration, maintenance, or repair of infrastructure in the United States.

SEC. 70913. IDENTIFICATION OF DEFICIENT PROGRAMS.

(a) IN GENERAL.—Not later than 60 days after the date of enactment of this Act, the head of each Federal agency shall— Notice. Reports.

(1) submit to the Office of Management and Budget and to Congress, including a separate notice to each appropriate congressional committee, a report that identifies each Federal financial assistance program for infrastructure administered by the Federal agency; and

(2) publish in the Federal Register the report under paragraph (1). Federal Register, publication.

(b) REQUIREMENTS.—In the report under subsection (a), the head of each Federal agency shall, for each Federal financial assistance program—

(1) identify all domestic content procurement preferences applicable to the Federal financial assistance;

Assessment.

(2) assess the applicability of the domestic content procurement preference requirements, including—

(A) section 313 of title 23, United States Code;

(B) section 5323(j) of title 49, United States Code;

(C) section 22905(a) of title 49, United States Code;

(D) section 50101 of title 49, United States Code;

(E) section 603 of the Federal Water Pollution Control Act (33 U.S.C. 1388);

(F) section 1452(a)(4) of the Safe Drinking Water Act (42 U.S.C. 300j–12(a)(4));

(G) section 5035 of the Water Infrastructure Finance and Innovation Act of 2014 (33 U.S.C. 3914);

(H) any domestic content procurement preference included in an appropriations Act; and

(I) any other domestic content procurement preference in Federal law (including regulations);

(3) provide details on any applicable domestic content procurement preference requirement, including the purpose, scope, applicability, and any exceptions and waivers issued under the requirement; and

(4) include a description of the type of infrastructure projects that receive funding under the program, including information relating to—

(A) the number of entities that are participating in the program;

(B) the amount of Federal funds that are made available for the program for each fiscal year; and

Determination.

(C) any other information the head of the Federal agency determines to be relevant.

(c) LIST OF DEFICIENT PROGRAMS.—In the report under subsection (a), the head of each Federal agency shall include a list of Federal financial assistance programs for infrastructure identified under that subsection for which a domestic content procurement preference requirement—

(1) does not apply in a manner consistent with section 70914; or

(2) is subject to a waiver of general applicability not limited to the use of specific products for use in a specific project.

SEC. 70914. APPLICATION OF BUY AMERICA PREFERENCE.

Deadline.

(a) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, the head of each Federal agency shall ensure that none of the funds made available for a Federal financial assistance program for infrastructure, including each deficient program, may be obligated for a project unless all of the iron, steel, manufactured products, and construction materials used in the project are produced in the United States.

(b) WAIVER.—The head of a Federal agency that applies a domestic content procurement preference under this section may waive the application of that preference in any case in which the head of the Federal agency finds that—

(1) applying the domestic content procurement preference would be inconsistent with the public interest;

(2) types of iron, steel, manufactured products, or construction materials are not produced in the United States in sufficient and reasonably available quantities or of a satisfactory quality; or

(3) the inclusion of iron, steel, manufactured products, or construction materials produced in the United States will increase the cost of the overall project by more than 25 percent.

(c) WRITTEN JUSTIFICATION.—Before issuing a waiver under subsection (b), the head of the Federal agency shall—

(1) make publicly available in an easily accessible location on a website designated by the Office of Management and Budget and on the website of the Federal agency a detailed written explanation for the proposed determination to issue the waiver; and

Public information. Web postings. Determination.

(2) provide a period of not less than 15 days for public comment on the proposed waiver.

Time period. Public comment.

(d) REVIEW OF WAIVERS OF GENERAL APPLICABILITY.—

(1) IN GENERAL.—An existing general applicability waiver or a general applicability waiver issued under subsection (b) shall be reviewed every 5 years after the date on which the waiver is issued.

Time period.

(2) REVIEW.—In conducting a review of a general applicability waiver, the head of a Federal agency shall—

Federal Register, publication.

(A) publish in the Federal Register a notice that—

Notice.

(i) describes the justification for a general applicability waiver; and

(ii) requests public comments for a period of not less than 30 days on the continued need for a general applicability waiver; and

Public comments. Time period.

(B) publish in the Federal Register a determination on whether to continue or discontinue the general applicability waiver, taking into account the comments received in response to the notice published under subparagraph (A).

Determination.

(3) LIMITATION ON THE REVIEW OF EXISTING WAIVERS OF GENERAL APPLICABILITY.—For a period of 5 years beginning on the date of enactment of this Act, paragraphs (1) and (2) shall not apply to any product-specific general applicability waiver that was issued more than 180 days before the date of enactment of this Act.

Time period. Effective date.

(e) CONSISTENCY WITH INTERNATIONAL AGREEMENTS.—This section shall be applied in a manner consistent with United States obligations under international agreements.

Applicability.

SEC. 70915. OMB GUIDANCE AND STANDARDS.

(a) GUIDANCE.—The Director of the Office of Management and Budget shall—

(1) issue guidance to the head of each Federal agency—

(A) to assist in identifying deficient programs under section 70913(c); and

(B) to assist in applying new domestic content procurement preferences under section 70914; and

(2) if necessary, amend subtitle A of title 2, Code of Federal Regulations (or successor regulations), to ensure that domestic content procurement preference requirements required by this

part or other Federal law are imposed through the terms and conditions of awards of Federal financial assistance.

(b) STANDARDS FOR CONSTRUCTION MATERIALS.—

Standards.

(1) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, the Director of the Office of Management and Budget shall issue standards that define the term "all manufacturing processes" in the case of construction materials.

(2) CONSIDERATIONS.—In issuing standards under paragraph (1), the Director shall—

(A) ensure that the standards require that each manufacturing process required for the manufacture of the construction material and the inputs of the construction material occurs in the United States; and

(B) take into consideration and seek to maximize the direct and indirect jobs benefited or created in the production of the construction material.

SEC. 70916. TECHNICAL ASSISTANCE PARTNERSHIP AND CONSULTATION SUPPORTING DEPARTMENT OF TRANSPORTATION BUY AMERICA REQUIREMENTS.

(a) DEFINITIONS.—In this section:

(1) BUY AMERICA LAW.—The term "Buy America law" means—

(A) section 313 of title 23, United States Code;

(B) section 5323(j) of title 49, United States Code;

(C) section 22905(a) of title 49, United States Code;

(D) section 50101 of title 49, United States Code; and

(E) any other domestic content procurement preference for an infrastructure project under the jurisdiction of the Secretary.

(2) SECRETARY.—The term "Secretary" means the Secretary of Transportation.

Deadline.

(b) TECHNICAL ASSISTANCE PARTNERSHIP.—Not later than 90 days after the date of the enactment of this Act, the Secretary shall enter into a technical assistance partnership with the Secretary of Commerce, acting through the Director of the National Institute of Standards and Technology—

(1) to ensure the development of a domestic supply base to support intermodal transportation in the United States, such as intercity high speed rail transportation, public transportation systems, highway construction or reconstruction, airport improvement projects, and other infrastructure projects under the jurisdiction of the Secretary;

(2) to ensure compliance with Buy America laws that apply to a project that receives assistance from the Federal Highway Administration, the Federal Transit Administration, the Federal Railroad Administration, the Federal Aviation Administration, or another office or modal administration of the Secretary of Transportation;

(3) to encourage technologies developed with the support of and resources from the Secretary to be transitioned into commercial market and applications; and

Procedures.
Consultation.

(4) to establish procedures for consultation under subsection (c).

(c) CONSULTATION.—Before granting a written waiver under a Buy America law, the Secretary shall consult with the Director

of the Hollings Manufacturing Extension Partnership regarding whether there is a domestic entity that could provide the iron, steel, manufactured product, or construction material that is the subject of the proposed waiver.

(d) ANNUAL REPORT.—Not later than 1 year after the date of enactment of this Act, and annually thereafter, the Secretary shall submit to the Committee on Commerce, Science, and Transportation, the Committee on Banking, Housing, and Urban Affairs, the Committee on Environment and Public Works, and the Committee on Homeland Security and Governmental Affairs of the Senate and the Committee on Transportation and Infrastructure and the Committee on Oversight and Reform of the House of Representatives a report that includes—

(1) a detailed description of the consultation procedures developed under subsection (b)(4);

(2) a detailed description of each waiver requested under a Buy America law in the preceding year that was subject to consultation under subsection (c), and the results of the consultation;

(3) a detailed description of each waiver granted under a Buy America law in the preceding year, including the type of waiver and the reasoning for granting the waiver; and

(4) an update on challenges and gaps in the domestic supply base identified in carrying out subsection (b)(1), including a list of actions and policy changes the Secretary recommends be taken to address those challenges and gaps. Update. Recommendations.

SEC. 70917. APPLICATION.

(a) IN GENERAL.—This part shall apply to a Federal financial assistance program for infrastructure only to the extent that a domestic content procurement preference as described in section 70914 does not already apply to iron, steel, manufactured products, and construction materials.

(b) SAVINGS PROVISION.—Nothing in this part affects a domestic content procurement preference for a Federal financial assistance program for infrastructure that is in effect and that meets the requirements of section 70914.

(c) LIMITATION WITH RESPECT TO AGGREGATES.—In this part—

(1) the term "construction materials" shall not include cement and cementitious materials, aggregates such as stone, sand, or gravel, or aggregate binding agents or additives; and Definition.

(2) the standards developed under section 70915(b)(1) shall not include cement and cementitious materials, aggregates such as stone, sand, or gravel, or aggregate binding agents or additives as inputs of the construction material.

PART II—MAKE IT IN AMERICA

SEC. 70921. REGULATIONS RELATING TO BUY AMERICAN ACT.

(a) IN GENERAL.—Not later than 1 year after the date of the enactment of this Act, the Director of the Office of Management and Budget ("Director"), acting through the Administrator for Federal Procurement Policy and, in consultation with the Federal Acquisition Regulatory Council, shall promulgate final regulations or other policy or management guidance, as appropriate, to standardize and simplify how Federal agencies comply with, report on, Deadline. Consultation.

and enforce the Buy American Act. The regulations or other policy or management guidance shall include, at a minimum, the following:

Determination.

(1) Guidelines for Federal agencies to determine, for the purposes of applying sections 8302(a) and 8303(b)(3) of title 41, United States Code, the circumstances under which the acquisition of articles, materials, or supplies mined, produced, or manufactured in the United States is inconsistent with the public interest.

Determination.

(2) Guidelines to ensure Federal agencies base determinations of non-availability on appropriate considerations, including anticipated project delays and lack of substitutable articles, materials, and supplies mined, produced, or manufactured in the United States, when making determinations of non-availability under section 8302(a)(1) of title 41, United States Code.

Procedures.
Public information.
Web posting.
Time periods.
Waiver.

(3)(A) Uniform procedures for each Federal agency to make publicly available, in an easily identifiable location on the website of the agency, and within the following time periods, the following information:

(i) A written description of the circumstances in which the head of the agency may waive the requirements of the Buy American Act.

(ii) Each waiver made by the head of the agency within 30 days after making such waiver, including a justification with sufficient detail to explain the basis for the waiver.

Consultation.

(B) The procedures established under this paragraph shall ensure that the head of an agency, in consultation with the head of the Made in America Office established under section 70923(a), may limit the publication of classified information, trade secrets, or other information that could damage the United States.

(4) Guidelines for Federal agencies to ensure that a project is not disaggregated for purposes of avoiding the applicability of the requirements under the Buy American Act.

(5) An increase to the price preferences for domestic end products and domestic construction materials.

(6) Amending the definitions of "domestic end product" and "domestic construction material" to ensure that iron and steel products are, to the greatest extent possible, made with domestic components.

(b) GUIDELINES RELATING TO WAIVERS.—

(1) INCONSISTENCY WITH PUBLIC INTEREST.—

Contracts.

(A) IN GENERAL.—With respect to the guidelines developed under subsection (a)(1), the Administrator shall seek to minimize waivers related to contract awards that—

(i) result in a decrease in employment in the United States, including employment among entities that manufacture the articles, materials, or supplies; or

(ii) result in awarding a contract that would decrease domestic employment.

(B) COVERED EMPLOYMENT.—For purposes of subparagraph (A), employment refers to positions directly involved in the manufacture of articles, materials, or supplies, and does not include positions related to management, research and development, or engineering and design.

(2) ASSESSMENT ON USE OF DUMPED OR SUBSIDIZED FOREIGN PRODUCTS.—

(A) IN GENERAL.—To the extent otherwise permitted by law, before granting a waiver in the public interest to the guidelines developed under subsection (a)(1) with respect to a product sourced from a foreign country, a Federal agency shall assess whether a significant portion of the cost advantage of the product is the result of the use of dumped steel, iron, or manufactured goods or the use of injuriously subsidized steel, iron, or manufactured goods.

(B) CONSULTATION.—The Federal agency conducting the assessment under subparagraph (A) shall consult with the International Trade Administration in making the assessment if the agency considers such consultation to be helpful.

(C) USE OF FINDINGS.—The Federal agency conducting the assessment under subparagraph (A) shall integrate any findings from the assessment into its waiver determination.

(c) SENSE OF CONGRESS ON INCREASING DOMESTIC CONTENT REQUIREMENTS.—It is the sense of Congress that the Federal Acquisition Regulatory Council should amend the Federal Acquisition Regulation to increase the domestic content requirements for domestic end products and domestic construction material to 75 percent, or, in the event of no qualifying offers, 60 percent.

(d) DEFINITION OF END PRODUCT MANUFACTURED IN THE UNITED STATES.—Not later than 1 year after the date of the enactment of this Act, the Federal Acquisition Regulatory Council shall amend part 25 of the Federal Acquisition Regulation to provide a definition for "end product manufactured in the United States," including guidelines to ensure that manufacturing processes involved in production of the end product occur domestically. Deadline.

SEC. 70922. AMENDMENTS RELATING TO BUY AMERICAN ACT.

(a) SPECIAL RULES RELATING TO AMERICAN MATERIALS REQUIRED FOR PUBLIC USE.—Section 8302 of title 41, United States Code, is amended by adding at the end the following new subsection:

"(c) SPECIAL RULES.—The following rules apply in carrying out the provisions of subsection (a): Applicability.

"(1) IRON AND STEEL MANUFACTURED IN THE UNITED STATES.—For purposes of this section, manufactured articles, materials, and supplies of iron and steel are deemed manufactured in the United States only if all manufacturing processes involved in the production of such iron and steel, from the initial melting stage through the application of coatings, occurs in the United States.

"(2) LIMITATION ON EXCEPTION FOR COMMERCIALLY AVAILABLE OFF-THE-SHELF ITEMS.—Notwithstanding any law or regulation to the contrary, including section 1907 of this title and the Federal Acquisition Regulation, the requirements of this section apply to all iron and steel articles, materials, and supplies.".

(b) PRODUCTION OF IRON AND STEEL FOR PURPOSES OF CONTRACTS FOR PUBLIC WORKS.—Section 8303 of title 41, United States Code, is amended—

(1) by redesignating subsection (c) as subsection (d); and

(2) by inserting after subsection (b) the following new subsection:

"(c) SPECIAL RULES.—

"(1) PRODUCTION OF IRON AND STEEL.—For purposes of this section, manufactured articles, materials, and supplies of iron and steel are deemed manufactured in the United States only if all manufacturing processes involved in the production of such iron and steel, from the initial melting stage through the application of coatings, occurs in the United States.

Applicability.

"(2) LIMITATION ON EXCEPTION FOR COMMERCIALLY AVAILABLE OFF-THE-SHELF ITEMS.—Notwithstanding any law or regulation to the contrary, including section 1907 of this title and the Federal Acquisition Regulation, the requirements of this section apply to all iron and steel articles, materials, and supplies used in contracts described in subsection (a).".

(c) ANNUAL REPORT.—Subsection (b) of section 8302 of title 41, United States Code, is amended to read as follows:

"(b) REPORTS.—

Time period.
Consultation.

"(1) IN GENERAL.—Not later than 180 days after the end of the fiscal year during which the Build America, Buy America Act is enacted, and annually thereafter for 4 years, the Director of the Office of Management and Budget, in consultation with the Administrator of General Services, shall submit to the Committee on Homeland Security and Governmental Affairs of the Senate and the Committee on Oversight and Reform of the House of Representatives a report on the total amount of acquisitions made by Federal agencies in the relevant fiscal year of articles, materials, or supplies acquired from entities that mine, produce, or manufacture the articles, materials, or supplies outside the United States.

"(2) EXCEPTION FOR INTELLIGENCE COMMUNITY.—This subsection does not apply to acquisitions made by an agency, or component of an agency, that is an element of the intelligence community as specified in, or designated under, section 3 of the National Security Act of 1947 (50 U.S.C. 3003).".

(d) DEFINITION.—Section 8301 of title 41, United States Code, is amended by adding at the end the following new paragraph:

"(3) FEDERAL AGENCY.—The term 'Federal agency' has the meaning given the term 'executive agency' in section 133 of this title.".

(e) CONFORMING AMENDMENTS.—Title 41, United States Code, is amended—

(1) in section 8302(a)—

(A) in paragraph (1)—

(i) by striking "department or independent establishment" and inserting "Federal agency"; and

(ii) by striking "their acquisition to be inconsistent with the public interest or their cost to be unreasonable" and inserting "their acquisition to be inconsistent with the public interest, their cost to be unreasonable, or that the articles, materials, or supplies of the class or kind to be used, or the articles, materials, or supplies from which they are manufactured, are not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities and of a satisfactory quality"; and

(B) in paragraph (2), by amending subparagraph (B) to read as follows:

"(B) to any articles, materials, or supplies procured pursuant to a reciprocal defense procurement memorandum of understanding (as described in section 8304 of this title), or a trade agreement or least developed country designation described in subpart 25.400 of the Federal Acquisition Regulation; and"; and

(2) in section 8303—

(A) in subsection (b)—

(i) by striking "department or independent establishment" each place it appears and inserting "Federal agency";

(ii) by amending subparagraph (B) of paragraph (1) to read as follows:

"(B) to any articles, materials, or supplies procured pursuant to a reciprocal defense procurement memorandum of understanding (as described in section 8304), or a trade agreement or least developed country designation described in subpart 25.400 of the Federal Acquisition Regulation; and"; and

(iii) in paragraph (3)—

(I) in the heading, by striking "INCONSISTENT WITH PUBLIC INTEREST" and inserting "WAIVER AUTHORITY"; and

(II) by striking "their purchase to be inconsistent with the public interest or their cost to be unreasonable" and inserting "their acquisition to be inconsistent with the public interest, their cost to be unreasonable, or that the articles, materials, or supplies of the class or kind to be used, or the articles, materials, or supplies from which they are manufactured, are not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities and of a satisfactory quality"; and

(B) in subsection (d), as redesignated by subsection (b)(1) of this section, by striking "department, bureau, agency, or independent establishment" each place it appears and inserting "Federal agency".

(f) EXCLUSION FROM INFLATION ADJUSTMENT OF ACQUISITION-RELATED DOLLAR THRESHOLDS.—Subparagraph (A) of section 1908(b)(2) of title 41, United States Code, is amended by striking "chapter 67" and inserting "chapters 67 and 83".

SEC. 70923. MADE IN AMERICA OFFICE.

(a) ESTABLISHMENT.—The Director of the Office of Management and Budget shall establish within the Office of Management and Budget an office to be known as the "Made in America Office". The head of the office shall be appointed by the Director of the Office of Management and Budget (in this section referred to as the "Made in America Director"). Appointment.

(b) DUTIES.—The Made in America Director shall have the following duties:

(1) Maximize and enforce compliance with domestic preference statutes.

(2) Develop and implement procedures to review waiver requests or inapplicability requests related to domestic preference statutes.

(3) Prepare the reports required under subsections (c) and (e).

(4) Ensure that Federal contracting personnel, financial assistance personnel, and non-Federal recipients are regularly trained on obligations under the Buy American Act and other agency-specific domestic preference statutes.

(5) Conduct the review of reciprocal defense agreements required under subsection (d).

(6) Ensure that Federal agencies, Federal financial assistance recipients, and the Hollings Manufacturing Extension Partnership partner with each other to promote compliance with domestic preference statutes.

(7) Support executive branch efforts to develop and sustain a domestic supply base to meet Federal procurement requirements.

Time period.

(c) OFFICE OF MANAGEMENT AND BUDGET REPORT.—Not later than 1 year after the date of the enactment of this Act, the Director of the Office of Management and Budget, working through the Made in America Director, shall report to the relevant congressional committees on the extent to which, in each of the three fiscal years prior to the date of enactment of this Act, articles, materials, or supplies acquired by the Federal Government were mined, produced, or manufactured outside the United States. Such report shall include for each Federal agency the following:

Summary.

(1) A summary of total procurement funds expended on articles, materials, and supplies mined, produced, or manufactured—

(A) inside the United States;

(B) outside the United States; and

(C) outside the United States—

(i) under each category of waiver under the Buy American Act;

(ii) under each category of exception under such chapter; and

(iii) for each country that mined, produced, or manufactured such articles, materials, and supplies.

(2) For each fiscal year covered by the report—

(A) the dollar value of any articles, materials, or supplies that were mined, produced, or manufactured outside the United States, in the aggregate and by country;

List.
Waivers.

(B) an itemized list of all waivers made under the Buy American Act with respect to articles, materials, or supplies, where available, and the country where such articles, materials, or supplies were mined, produced, or manufactured;

(C) if any articles, materials, or supplies were acquired from entities that mine, produce, or manufacture such articles, materials, or supplies outside the United States due to an exception (that is not the micro-purchase threshold exception described under section 8302(a)(2)(C) of title 41, United States Code), the specific exception that was used to purchase such articles, materials, or supplies; and

(D) if any articles, materials, or supplies were acquired from entities that mine, produce, or manufacture such articles, materials, or supplies outside the United States pursuant to a reciprocal defense procurement memorandum of understanding (as described in section 8304 of title 41, United States Code), or a trade agreement or least developed country designation described in subpart 25.400 of the Federal Acquisition Regulation, a citation to such memorandum of understanding, trade agreement, or designation.

(3) A description of the methods used by each Federal agency to calculate the percentage domestic content of articles, materials, and supplies mined, produced, or manufactured in the United States.

(d) REVIEW OF RECIPROCAL DEFENSE AGREEMENTS.—

Contracts.
Reports.
Deadline.
Determination.

(1) REVIEW OF PROCESS.—Not later than 180 days after the date of the enactment of this Act, the Made in America Director shall review the Department of Defense's use of reciprocal defense agreements to determine if domestic entities have equal and proportional access and report the findings of the review to the Director of the Office of Management and Budget, the Secretary of Defense, and the Secretary of State.

Assessment.

(2) REVIEW OF RECIPROCAL PROCUREMENT MEMORANDA OF UNDERSTANDING.—The Made in America Director shall review reciprocal procurement memoranda of understanding entered into after the date of the enactment of this Act between the Department of Defense and its counterparts in foreign governments to assess whether domestic entities will have equal and proportional access under the memoranda of understanding and report the findings of the review to the Director of the Office of Management and Budget, the Secretary of Defense, and the Secretary of State.

Summary.

(e) REPORT ON USE OF MADE IN AMERICA LAWS.—The Made in America Director shall submit to the relevant congressional committees a summary of each report on the use of Made in America Laws received by the Made in America Director pursuant to section 11 of Executive Order 14005, dated January 25, 2021 (relating to ensuring the future is made in all of America by all of America's workers) not later than 90 days after the date of the enactment of this Act or receipt of the reports required under section 11 of such Executive Order, whichever is later.

(f) DOMESTIC PREFERENCE STATUTE DEFINED.—In this section, the term "domestic preference statute" means any of the following:

(1) the Buy American Act;

(2) a Buy America law (as that term is defined in section 70916(a));

(3) the Berry Amendment;

(4) section 604 of the American Recovery and Reinvestment Act of 2009 (6 U.S.C. 453b) (commonly referred to as the "Kissell amendment");

(5) section 2533b of title 10 (commonly referred to as the "specialty metals clause");

(6) laws requiring domestic preference for maritime transport, including the Merchant Marine Act, 1920 (Public Law 66–261), commonly known as the "Jones Act"; and

(7) any other law, regulation, rule, or executive order relating to Federal financial assistance awards or Federal

procurement, that requires, or provides a preference for, the purchase or acquisition of goods, products, or materials produced in the United States, including iron, steel, construction material, and manufactured goods offered in the United States.

SEC. 70924. HOLLINGS MANUFACTURING EXTENSION PARTNERSHIP ACTIVITIES.

(a) USE OF HOLLINGS MANUFACTURING EXTENSION PARTNERSHIP TO REFER NEW BUSINESSES TO CONTRACTING OPPORTUNITIES.—The head of each Federal agency shall work with the Director of the Hollings Manufacturing Extension Partnership, as necessary, to ensure businesses participating in this Partnership are aware of their contracting opportunities.

(b) AUTOMATIC ENROLLMENT IN GSA ADVANTAGE!.—The Administrator of the General Services Administration and the Secretary of Commerce, acting through the Under Secretary of Commerce for Standards and Technology, shall jointly ensure that each business that participates in the Hollings Manufacturing Extension Partnership is automatically enrolled in General Services Administration Advantage!.

Applicability.

SEC. 70925. UNITED STATES OBLIGATIONS UNDER INTERNATIONAL AGREEMENTS.

This part, and the amendments made by this part, shall be applied in a manner consistent with United States obligations under international agreements.

SEC. 70926. DEFINITIONS.

In this part:

(1) BERRY AMENDMENT.—The term "Berry Amendment" means section 2533a of title 10, United States Code.

(2) BUY AMERICAN ACT.—The term "Buy American Act" means chapter 83 of title 41, United States Code.

(3) FEDERAL AGENCY.—The term "Federal agency" has the meaning given the term "executive agency" in section 133 of title 41, United States Code.

(4) RELEVANT CONGRESSIONAL COMMITTEES.—The term "relevant congressional committees" means—

(A) the Committee on Homeland Security and Governmental Affairs, the Committee on Commerce, Science, and Transportation, the Committee on Environment and Public Works, the Committee on Banking, Housing, and Urban Affairs, and the Committee on Armed Services of the Senate; and

(B) the Committee on Oversight and Reform, the Committee on Armed Services, and the Committee on Transportation and Infrastructure of the House of Representatives.

Determinations.

(5) WAIVER.—The term "waiver", with respect to the acquisition of an article, material, or supply for public use, means the inapplicability of chapter 83 of title 41, United States Code, to the acquisition by reason of any of the following determinations under section 8302(a)(1) or 8303(b) of such title:

(A) A determination by the head of the Federal agency concerned that the acquisition is inconsistent with the public interest.

(B) A determination by the head of the Federal agency concerned that the cost of the acquisition is unreasonable.

(C) A determination by the head of the Federal agency concerned that the article, material, or supply is not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality.

SEC. 70927. PROSPECTIVE AMENDMENTS TO INTERNAL CROSS-REFERENCES.

(a) SPECIALTY METALS CLAUSE REFERENCE.—Section 70923(f)(5) is amended by striking "section 2533b" and inserting "section 4863".

(b) BERRY AMENDMENT REFERENCE.—Section 70926(1) is amended by striking "section 2533a" and inserting "section 4862".

(c) EFFECTIVE DATE.—The amendments made by this section shall take effect on January 1, 2022.

Subtitle B—BuyAmerican.gov

BuyAmerican.gov Act of 2021.

SEC. 70931. SHORT TITLE.

This subtitle may be cited as the "BuyAmerican.gov Act of 2021".

SEC. 70932. DEFINITIONS.

In this subtitle:

(1) BUY AMERICAN LAW.—The term "Buy American law" means any law, regulation, Executive order, or rule relating to Federal contracts, grants, or financial assistance that requires or provides a preference for the purchase or use of goods, products, or materials mined, produced, or manufactured in the United States, including—

(A) chapter 83 of title 41, United States Code (commonly referred to as the "Buy American Act");

(B) section 5323(j) of title 49, United States Code;

(C) section 313 of title 23, United States Code;

(D) section 50101 of title 49, United States Code;

(E) section 24405 of title 49, United States Code;

(F) section 608 of the Federal Water Pollution Control Act (33 U.S.C. 1388);

(G) section 1452(a)(4) of the Safe Drinking Water Act (42 U.S.C. 300j–12(a)(4));

(H) section 5035 of the Water Resources Reform and Development Act of 2014 (33 U.S.C. 3914);

(I) section 2533a of title 10, United States Code (commonly referred to as the "Berry Amendment"); and

(J) section 2533b of title 10, United States Code.

(2) EXECUTIVE AGENCY.—The term "executive agency" has the meaning given the term "agency" in paragraph (1) of section 3502 of title 44, United States Code, except that it does not include an independent regulatory agency, as that term is defined in paragraph (5) of such section.

(3) BUY AMERICAN WAIVER.—The term "Buy American waiver" refers to an exception to or waiver of any Buy American law, or the terms and conditions used by an agency in granting an exception to or waiver from Buy American laws.

SEC. 70933. SENSE OF CONGRESS ON BUYING AMERICAN.

It is the sense of Congress that—

(1) every executive agency should maximize, through terms and conditions of Federal financial assistance awards and Federal procurements, the use of goods, products, and materials produced in the United States and contracts for outsourced government service contracts to be performed by United States nationals;

(2) every executive agency should scrupulously monitor, enforce, and comply with Buy American laws, to the extent they apply, and minimize the use of waivers; and

(3) every executive agency should use available data to routinely audit its compliance with Buy American laws.

Public information.

SEC. 70934. ASSESSMENT OF IMPACT OF FREE TRADE AGREEMENTS.

Not later than 150 days after the date of the enactment of this Act, the Secretary of Commerce, the United States Trade Representative, and the Director of the Office of Management and Budget shall assess the impacts in a publicly available report of all United States free trade agreements, the World Trade Organization Agreement on Government Procurement, and Federal permitting processes on the operation of Buy American laws, including their impacts on the implementation of domestic procurement preferences.

SEC. 70935. JUDICIOUS USE OF WAIVERS.

(a) IN GENERAL.—To the extent permitted by law, a Buy American waiver that is determined by an agency head or other relevant official to be in the public interest shall be construed to ensure the maximum utilization of goods, products, and materials produced in the United States.

(b) PUBLIC INTEREST WAIVER DETERMINATIONS.—To the extent permitted by law, determination of public interest waivers shall be made by the head of the agency with the authority over the Federal financial assistance award or Federal procurement under consideration.

SEC. 70936. ESTABLISHMENT OF BUYAMERICAN.GOV WEBSITE.

Deadline.

(a) IN GENERAL.—Not later than one year after the date of the enactment of this Act, the Administrator of General Services shall establish an Internet website with the address BuyAmerican.gov that will be publicly available and free to access. The website shall include information on all waivers of and exceptions to Buy American laws since the date of the enactment of this Act that have been requested, are under consideration, or have been granted by executive agencies and be designed to enable manufacturers and other interested parties to easily identify waivers. The website shall also include the results of routine audits to determine data errors and Buy American law violations after the award of a contract. The website shall provide publicly available contact information for the relevant contracting agencies.

Determination.
Data.
Public information.

(b) UTILIZATION OF EXISTING WEBSITE.—The requirements of subsection (a) may be met by utilizing an existing website, provided that the address of that website is BuyAmerican.gov.

SEC. 70937. WAIVER TRANSPARENCY AND STREAMLINING FOR CONTRACTS.

Consultation.

(a) COLLECTION OF INFORMATION.—The Administrator of General Services, in consultation with the heads of relevant agencies, shall develop a mechanism to collect information on requests to

invoke a Buy American waiver for a Federal contract, utilizing existing reporting requirements whenever possible, for purposes of providing early notice of possible waivers via the website established under section 70936.

(b) WAIVER TRANSPARENCY AND STREAMLINING.—

(1) REQUIREMENT.—Prior to granting a request to waive a Buy American law, the head of an executive agency shall submit a request to invoke a Buy American waiver to the Administrator of General Services, and the Administrator of General Services shall make the request available on or through the public website established under section 70936 for public comment for not less than 15 days.

Public comment. Time period.

(2) EXCEPTION.—The requirement under paragraph (1) does not apply to a request for a Buy American waiver to satisfy an urgent contracting need in an unforeseen and exigent circumstance.

(c) INFORMATION AVAILABLE TO THE EXECUTIVE AGENCY CONCERNING THE REQUEST.—

(1) REQUIREMENT.—No Buy American waiver for purposes of awarding a contract may be granted if, in contravention of subsection (b)—

(A) information about the waiver was not made available on the website under section 70936; or

(B) no opportunity for public comment concerning the request was granted.

(2) SCOPE.—Information made available to the public concerning the request included on the website described in section 70936 shall properly and adequately document and justify the statutory basis cited for the requested waiver. Such information shall include—

(A) a detailed justification for the use of goods, products, or materials mined, produced, or manufactured outside the United States;

(B) for requests citing unreasonable cost as the statutory basis of the waiver, a comparison of the cost of the domestic product to the cost of the foreign product or a comparison of the overall cost of the project with domestic products to the overall cost of the project with foreign-origin products or services, pursuant to the requirements of the applicable Buy American law, except that publicly available cost comparison data may be provided in lieu of proprietary pricing information;

(C) for requests citing the public interest as the statutory basis for the waiver, a detailed written statement, which shall include all appropriate factors, such as potential obligations under international agreements, justifying why the requested waiver is in the public interest; and

(D) a certification that the procurement official or assistance recipient made a good faith effort to solicit bids for domestic products supported by terms included in requests for proposals, contracts, and nonproprietary communications with the prime contractor.

Certification.

(d) NONAVAILABILITY WAIVERS.—

(1) IN GENERAL.—Except as provided under paragraph (2), for a request citing nonavailability as the statutory basis for a Buy American waiver, an executive agency shall provide an explanation of the procurement official's efforts to procure

Public comments. Determination.

a product from a domestic source and the reasons why a domestic product was not available from a domestic source. Those explanations shall be made available on BuyAmerican.gov prior to the issuance of the waiver, and the agency shall consider public comments regarding the availability of the product before making a final determination.

(2) EXCEPTION.—An explanation under paragraph (1) is not required for a product the nonavailability of which is established by law or regulation.

Recommendations.

SEC. 70938. COMPTROLLER GENERAL REPORT.

Not later than two years after the date of the enactment of this Act, the Comptroller General of the United States shall submit to Congress a report describing the implementation of this subtitle, including recommendations for any legislation to improve the collection and reporting of information regarding waivers of and exceptions to Buy American laws.

SEC. 70939. RULES OF CONSTRUCTION.

(a) DISCLOSURE REQUIREMENTS.—Nothing in this subtitle shall be construed as preempting, superseding, or otherwise affecting the application of any disclosure requirement or requirements otherwise provided by law or regulation.

(b) ESTABLISHMENT OF SUCCESSOR INFORMATION SYSTEMS.—Nothing in this subtitle shall be construed as preventing or otherwise limiting the ability of the Administrator of General Services to move the data required to be included on the website established under subsection (a) to a successor information system. Any such information system shall include a reference to BuyAmerican.gov.

Applicability.

SEC. 70940. CONSISTENCY WITH INTERNATIONAL AGREEMENTS.

This subtitle shall be applied in a manner consistent with United States obligations under international agreements.

SEC. 70941. PROSPECTIVE AMENDMENTS TO INTERNAL CROSS-REFERENCES.

(a) IN GENERAL.—Section 70932(1) is amended—

(1) in subparagraph (I), by striking "section 2533a" and inserting "section 4862"; and

(2) in subparagraph (J), by striking "section 2533b" and inserting "section 4863".

(b) EFFECTIVE DATE.—The amendments made by subsection (a) shall take effect on January 1, 2022.

Make PPE in America Act.

Subtitle C—Make PPE in America

SEC. 70951. SHORT TITLE.

This subtitle may be cited as the "Make PPE in America Act".

SEC. 70952. FINDINGS.

Congress makes the following findings:

(1) The COVID–19 pandemic has exposed the vulnerability of the United States supply chains for, and lack of domestic production of, personal protective equipment (PPE).

(2) The United States requires a robust, secure, and wholly domestic PPE supply chain to safeguard public health and national security.

(3) Issuing a strategy that provides the government's anticipated needs over the next three years will enable suppliers to assess what changes, if any, are needed in their manufacturing capacity to meet expected demands.

(4) In order to foster a domestic PPE supply chain, United States industry needs a strong and consistent demand signal from the Federal Government providing the necessary certainty to expand production capacity investment in the United States.

(5) In order to effectively incentivize investment in the United States and the re-shoring of manufacturing, long-term contracts must be no shorter than three years in duration.

(6) To accomplish this aim, the United States should seek to ensure compliance with its international obligations, such as its commitments under the World Trade Organization's Agreement on Government Procurement and its free trade agreements, including by invoking any relevant exceptions to those agreements, especially those related to national security and public health.

(7) The United States needs a long-term investment strategy for the domestic production of PPE items critical to the United States national response to a public health crisis, including the COVID–19 pandemic.

SEC. 70953. REQUIREMENT OF LONG-TERM CONTRACTS FOR DOMESTICALLY MANUFACTURED PERSONAL PROTECTIVE EQUIPMENT.

(a) DEFINITIONS.—In this section:

(1) APPROPRIATE CONGRESSIONAL COMMITTEES.—The term "appropriate congressional committees" means—

(A) the Committee on Homeland Security and Governmental Affairs, the Committee on Health, Education, Labor, and Pensions, the Committee on Finance, and the Committee on Veterans' Affairs of the Senate; and

(B) the Committee on Homeland Security, the Committee on Oversight and Reform, the Committee on Energy and Commerce, the Committee on Ways and Means, and the Committee on Veterans' Affairs of the House of Representatives.

(2) COVERED SECRETARY.—The term "covered Secretary" means the Secretary of Homeland Security, the Secretary of Health and Human Services, and the Secretary of Veterans Affairs.

(3) PERSONAL PROTECTIVE EQUIPMENT.—The term "personal protective equipment" means surgical masks, respirator masks and powered air purifying respirators and required filters, face shields and protective eyewear, gloves, disposable and reusable surgical and isolation gowns, head and foot coverings, and other gear or clothing used to protect an individual from the transmission of disease.

(4) UNITED STATES.—The term "United States" means the 50 States, the District of Columbia, and the possessions of the United States.

(b) CONTRACT REQUIREMENTS FOR DOMESTIC PRODUCTION.—Beginning 90 days after the date of the enactment of this Act, Effective date.

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GEOTECHNICAL INVESTIGATION

FOR

PROPOSED ARKANSAS STATE VETERANS CEMETERY ADDITIONS

BIRDEYE, ARKANSAS

* * * * *

ECOLOGICAL DESIGN GROUP, INC.

CONSULTING ENGINEERS

210 EAST MERRIMAN

WYNNE, ARKANSAS 72396

* * * *

MARCH 15, 2022

JOB NO. 17011

ANDERSON ENGINEERING CONSULTANTS, INC.

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March 15, 2022

Job No. 17011

Email: msmith@ecologicaldg.com

Mr. Martin Smith, PLA
Ecological Design Group, Inc.
210 East Merriman
Wynne, Arkansas 72396

Re: Geotechnical Investigation
Proposed Arkansas State Veterans Cemetery Additions
Birdeye, Arkansas

Dear Mr. Smith:

It is our pleasure to submit this report on the soil and foundation investigation for the proposed Arkansas State Veterans Cemetery Additions in Birdeye, Arkansas. The investigation consisted of field test borings, soils laboratory analyses, earthwork, foundation, and pavement recommendations, pavement distress evaluation, and groundwater condition evaluation.

We recommend that our geotechnical services be continued for any additional investigation and in the construction phase of the project for this is the most feasible means of assuring the owners, designers, and builders that the geotechnical design intent is being achieved. In the event that adverse geotechnical conditions are encountered during construction, they can be identified and evaluated, and prompt remedial measures can be taken during construction.

We wish to express our appreciation for the opportunity of serving you and other members of the design team. We are available for further consultation during the design and construction at any time, should you have a need for further assistance.

Very truly yours,

ANDERSON ENGINEERING CONSULTANTS, INC.

CERTIFICATE OF AUTHORIZATION
ANDERSON ENGINEERING CONSULTANTS, INC.
No. 73
ARKANSAS - ENGINEER

Alexandra W. "Alex" Gangluff, P.E.
Senior Geotechnical Engineer

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 11241
ALEXANDRA W. GANGLUFF
03-15-22

Scott W. Anderson, R.E.P., P.E.
Principal Engineer

AWG/SWA/llb
17011.GEO

GEOTECHNICAL INVESTIGATION

FOR

PROPOSED ARKANSAS STATE VETERANS CEMETERY ADDITIONS

BIRDEYE, ARKANSAS

* * * * *

ECOLOGICAL DESIGN GROUP, INC.

CONSULTING ENGINEERS

210 EAST MERRIMAN

WYNNE, ARKANSAS 72396

* * * * *

BY

ANDERSON ENGINEERING CONSULTANTS, INC.

GEOTECHNICAL CONSULTANTS

10205 ROCKWOOD ROAD

LITTLE ROCK, ARKANSAS 72204

MARCH 15, 2022 JOB NO. 17011

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PURPOSE

The primary purposes of this geotechnical investigation were:

a. To determine the physical and engineering properties of the soil within the areas of the proposed construction and remediation with respect to their suitability for the support of the proposed structures.

b. To make recommendations for the earthwork, foundations, pavements, groundwater conditions, and pavement remediation suited for the prevailing soil conditions within the proposed construction and remediation areas.

c. To evaluate and recommend the design procedures for the various soil, foundation, pavement, groundwater, earthwork, and remediation items in accordance with current engineering practices.

SCOPE

The scope of this geotechnical investigation includes the following:

a. The geological features in the vicinity of the project consist primarily of Quaternary aged Terrace deposits of sand, silt, and clay on the east side of the site and Tertiary aged Claiborne deposits of non-marine sand, silt, and clay on the west side of the site. The site is located near Birdeye, Arkansas, as shown on the Vicinity Map, Plate 1.

b. As directed by the client a total of twenty-three borings were advanced to obtain the necessary data at the site. This included nine borings in the proposed roadway, seven borings in future crypt areas, six borings in areas of existing pavement distress, and one boring in the vicinity of a future well. The site was accessed by a truck mounted drill rig. The borings were located at the site as shown on the Plan of Borings, Plate 2.

c. A site visit was made to locate the borings and observe the distresses in various locations in the pavement areas. Photographs showing the site conditions and distresses are included on Plates 3 through 6.

d. Field tests consisted of Standard Penetration test samples (ASTM D 1586) taken in all the borings. Logs of the borings illustrating stratigraphic and field test information are provided on Plates 7 through 29. The Field Classification System for Soil Exploration and Key to Soil Classification and Symbols are provide on Plates 30 and 31, respectively.

e. The soils analyses were based on N-values obtained from the drilling program, visual observations, and other routine inspection/classification methods. The soils were classified basically in accordance with the Unified Soil Classification System (ASTM D 2487) shown on Plate 32, however, visual classifications may be given in some instances on the logs.

f. A laboratory testing program was developed by the geotechnical engineer after visual observation of the samples obtained and review of the field boring logs. Laboratory tests included moisture content determination, Atterberg limits, and mechanical grain size analyses. The individual test results are provided in Appendix B.

g. Earthwork features of the site have been analyzed from results obtained from the laboratory testing program and data gathered from the field investigation. The earthwork features considered include site preparation, fill placement, excavation criteria, and adverse weather conditions.

h. Groundwater conditions across the site areas were determined from the results of the field investigation, historical site data and state water well records. Discussion of an additional groundwater evaluation program is provided.

i. The foundation analyses were based on based on AECI's current foundation design procedures using the N-values obtained during drilling, results of the laboratory tests, and the earthwork criteria provided.

j. The flexible and rigid pavement sections discussed in this report are based on the design method utilizing estimated California Bearing Ratio (CBR) data derived from field/laboratory investigations and generally accepted industry standards. The proposed flexible and rigid pavement sections are provided on Plate 33.

k. Pavement distress and potential remedial options are discussed for cracks in the driveway areas and around the assembly area circle.

AUTHORITY

This geotechnical investigation was authorized by signed acceptance of AECI Proposal No. 21417 on December 10, 2021, by Mr. Martin Smith, of Ecological Design Group, Inc. the consulting engineer and owner's representative for the proposed project.

PROJECT DESCRIPTION

The Arkansas State Veterans Cemetery is located on the east side of Highway 163 approximately one mile north of the intersection with Highway 42 in the Birdeye, Arkansas community, as shown on the Vicinity Map, Plate 1. The project will consist of a new service road linking the cortege area to Highway 163, additional crypt areas in Section A, groundwater investigation in Section K, a new well pump building in the northeast corner of the property, and pavement distress investigation for driveways adjacent to Section G, Section K and the assembly area. The areas of the field investigation were covered either by existing pavements or mown grasses. However, the cemetery property also includes a creek, ponds, various buildings, appurtenances, memorials, ornamental trees, a wooded area, various landscaped areas, and utilities. At the time of the field investigation the site was relatively dry and accessible to a truck mounted drill rig. The existing site grades were provided on undated As Built drawings. The existing grades range from a high elevation of 273.0 msl at the intersection of Highway 163 and the cemetery entrance to a low elevation of 223.0 msl along the eastern boundary near the storm water reservoir. However, minimal cut or fill is anticipated for the new construction and no grade changes are anticipated in areas that are already developed. The site topography is gently sloping from high elevations along Highway 163 on the

west side of the site down to the east. The surface drainage of the site is generally towards the central eastern boundary to the storm water reservoir and Tupelo Reflection feature. Additionally two small creeks on the western boundary bisects the site from west to east and join into a single creek to enter the Tupelo Reflection feature near the eastern property line. The contractor should be prepared for some access and mobility difficulties, especially during wet or winter weather, in areas where existing topsoil or pavements are removed.

REGIONAL GEOLOGY

The 1993 Geologic Map of Arkansas, as prepared by the Arkansas Geologic Commission and the United States Geological Survey, indicates that the project is located within the Mississippi Embayment Physiographic Region of eastern Arkansas. The site lies on the eastern flank of Crowley's Ridge. Crowley's Ridge is considered an erosional remnant formed by the ancient Mississippi River and Ohio River during the Pleistocene era and stands between one hundred and two hundred and fifty feet above the surrounding lowlands. Crowley's Ridge generally consists of Quaternary aged deposits of loess underlain by Quaternary aged sand and gravel. The sand and gravel are in turn underlain by the Claiborne Group of Tertiary age. In the vicinity of the site the Claiborne has been mapped by the Arkansas Geologic Commission between elevation ±300 msl and ±250 msl. The sand and gravel and Claiborne are exposed surficially as thin bands near the base of the ridge. Along the eastern flank of Crowley's Ridge a narrow band of Quaternary aged Terrace deposits has been mapped by the Arkansas Geologic Commission between elevation ±250 msl and ±210 msl with Quaternary aged stream overbank deposits further east. Based on the mapped elevations it may be assumed that the site will surficially have both Tertiary aged Claiborne, on the west side of the site, and Quaternary aged Terrace deposits, on the east side of the site. However, other geologic units may exist on the site, either surficially or sub-surficially, depending on various erosion and deposition mechanisms.

The Stratigraphic Summary of Arkansas, also published by the Arkansas Geologic Commission, provides descriptions of the various geologic units shown on the Geologic Map of Arkansas. The following summarizes the various units that may exist surficially or sub-surficially at the site from oldest to youngest.

a. Tertiary aged Claiborne - The Claiborne is chiefly non-marine in origin, but does contain some marine intervals. The unit is composed of sands, silts, and silty clays that are occasionally enriched in carbonaceous material. The silts are usually clayey and the clays are normally silty or sandy. Lignite beds are present in this interval.
b. Quaternary aged Sand and Gravel - Sands and gravels are present on Crowley's Ridge underlying loess deposits. This interval has not been assigned to a specific stratigraphic unit or studied in detail.

c. Quaternary aged Loess - Loess consists of calcareous silt in thin to massive beds that will often hold a high vertical slope. However, loess is a wind blown sediment that will easily erode, especially in the presence of water. Calcareous concretions are regularly found in the unit.

d. Quaternary aged Terrace Deposits - The terrace deposits include a complex sequence of unconsolidated gravels, sandy gravels, sands, silty sands, silts, clayey silts, and clays. The individual deposits are often lenticular and discontinuous.

e. Quaternary aged Alluvium (Stream Overbank) - The deposits indicated by this notation are alluvial deposits of small streams, the overbank deposits of major streams, or older meander belt deposits of major streams. The partition of this unit from other alluvial deposits was based more on geomorphic considerations than lithology or age.

GROUNDWATER CONDITIONS

Groundwater was encountered in five borings in the vicinity of Section K, including C6, C7, P1, P2, and P3, at depths of 5.0 feet during drilling and ranging from 3.0 to 7.0 upon completion. Additionally, groundwater was encountered at depths of 5.0 feet during drilling in borings SR2 and SR9. Finally, groundwater was encountered at a depth of 15.0 during drilling in boring B1. Previous experience at the site, June 2008 and spring 2010, indicated that similar groundwater levels of 3.0 to 6.0 feet were encountered across the site. Additionally, a pump test performed in the spring of 2010 indicated that a 14.0 foot deep well would return to a static water level of 6.0 feet within thirty minutes of dewatering. Finally, the Arkansas Natural Resources Commission (ANRC) online database for Water Well Construction Reports indicates that eight wells are located within two miles of the site. The ANRC database indicates groundwater levels between 15.0 and 95.0 feet, with an average of ±40 feet, below the ground surface in wells that ranged from 90.0 to 370.0 feet, with an average of ±140 feet, deep.

From this groundwater data it may be concluded that the groundwater encountered at depths of ±5.0 feet is likely a shallow perched water level with the long term static water level at a depth of 15.0 feet or greater. Both the perched water level and the long term static water level are considered seasonal in nature and will rise and fall with fluctuations in rainfall and seasonal pumping associated with agricultural irrigation. However, the shallow perched water level has been encountered across the entire site at various times of year over the past fifteen years. Additionally, it is understood that this shallow perched water level is often encountered during excavation in the crypt areas, especially in Section K, and creates difficulties during interments. It may be speculated that the perched water level is tied to the higher elevations of Crowley's Ridge immediately west of the site and possibly to the Quaternary aged Sand and Gravel unit underlying this physiographic feature. Thus, it should be concluded that the shallow perched water table is a long-term problem at the site that should require additional investigation and long-term remediation. Additional recommendations for investigation and remediation will be provided in a subsequent section of this report.

For the purposes of new road construction, the contractor should anticipate a shallow perched water level that will fluctuate with seasonal changes in precipitation. Perched water is typically considered to be brief in duration and typically in low quantities. However, evidence suggest a high recharge rate for the shallow perched water at the site. Thus, the contractor should be prepared to provide sump/pump, gravity drainage ditches, and other dewatering means if perched water is encountered during earthwork. Additionally, soft, wet and pumpable soils can be expected in the vicinity of perched water. In pavement areas, these soils should be removed and replaced with a select fill soil compacted in accordance with criteria provided in the **EARTHWORK** section of this report. Since the quantity of undercut is unknown, it would be prudent to establish a unit rate for this item of work to minimize construction delays.

SITE DRAINAGE

Consideration should be given to control of surface water runoff during construction of the proposed road. The existing topography in the vicinity of the road is gently sloping down to the east. Maintaining or improving the existing drainage should be considered during the early stages of construction. The use of gravity drainage ditches may also be considered to improve site conditions during earthwork. The proposed construction area should be maintained in a well drained condition to prevent water from ponding within the pavement and landscaped areas. Saturation of the subgrade soils could require additional amounts of undercut, especially during wet/winter months. The designer should also ensure that the final grading plan has positive drainage away from the pavement areas. The drainage in the vicinity of the road addition should be incorporated into the overall stormwater drainage plan for the site.

Site drainage may also impact the shallow perched groundwater levels encountered at the site. The site is receiving significant surface water from Crowley's Ridge immediately adjacent to the west. However, once the surface water from Crowley's Ridge reaches the flatter topography of the site, increased infiltration may add to the high perched groundwater level. The shallow perched water levels, especially in Section K, may also be exacerbated by the presence of the creeks to the south and the ponds to the east. These surficial drainage structures may be creating barriers to movement of subsurface water.

GROUNDWATER REMEDIATION

As previously discussed the long term shallow perch water level is a problem at the site. However, sufficient data is not available to design a dewatering system for the cemetery. Thus, a long term groundwater monitoring investigation is recommended. This investigation should include the installation of monitoring wells across the site, but especially in the vicinity of the existing stormwater drainage features including the creeks and ponds. Some locations should include clusters of both shallow and deep wells to measure both the shallow perched water level and the deeper long-

term static water level and should be spaced at not more than five hundred feet apart. Soil sampling should also be required during well installation to adequately understand the relationships between the deeper soil stratigraphy and the groundwater levels. The water levels in the monitor wells should be recorded weekly and immediately after precipitation events for a time frame on the order of one year to provide groundwater data for seasonal fluctuations. After this groundwater data has been collected and analyzed, a site dewatering plan can be developed to lower the shallow perched water levels below the elevations necessary for site excavations.

The dewatering plan may consist of one or several of the following dewatering options:

a. Well Points - Numerous, relatively shallow well points could be placed to dewater a relatively small areas. This would be a relatively cost effective way to dewater only the sections with active interments. However, the manifolds and pumps required to tie the well points together may be ascetically unpleasing.

b. Dewatering Wells - A single deep, high volume dewatering well can theoretically dewater a large area. This would allow for a larger spacing of wells and would be less intrusive ascetically. However, it is unlikely that a deep well will efficiently dewater a shallow perched water table.

c. Relief Wells - Depending on the stratigraphic mechanism that creates a barrier between the shallow perched water and the underlying long-term static water level, relief wells could drain the shallow perched water into the underlying static water table.

d. French Drain Network - A series of french drains could be manually installed or directionally drilled to stop ingress of additional shallow water and to provide egress for the existing shallow perched water. However, if adequate fall is not available across the site to allow the french drains to be gravity drains, sumps and pumps will also be required.

e. Cut-Off Walls - The strategic placement of shallow bentonite or soil/bentonite cut-off walls could lower the elevation of the perched groundwater for a limited distance downstream of the cut-off wall. By placing a physical barrier of low permeability material below the ground surface, the groundwater flows are permanently altered. However, the effectiveness of dewatering will reduce with distance beyond the cut-off wall and multiple walls would be required to effectively lower the perched water level across the entire site.

SEISMICITY

The seismic analysis requires the selection of appropriate site coefficients and other seismic values that can be established from the subsurface conditions, guidelines set forth by local, state, and federal codes, and historical seismic information. The structure should be designed using guidelines as set forth in the 2015 International Building Code (IBC) as required by **Arkansas Act 1100-1991** (and subsequent amendments) as determined appropriate. The predominant soil types are soft to hard clay (CL), silty clay (CL-ML), and silt with some very loose to medium dense clayey sand (SC), silty

clayey sand (SC-SM), sandy silt (ML), silty sand (SM), and sand (SP) with various amounts of gravel. These soils are likely from the Tertiary aged Claiborne, Quaternary aged Sand and Gravel, or Quaternary aged Terrace deposits. The following seismic values are considered applicable to this project site based upon the site conditions and the 2015 IBC seismic values for Arkansas:

IBC (2015)

Site Class	D
Value of Site Coefficient (F_a)	1.000
Value of Site Coefficient (F_v)	1.500
Spectral Response Acceleration at Short Periods (S_s)	2.467 g
Spectral Response Acceleration at a Period of 1.0 Second (S_1)	0.928 g
Peak Ground Acceleration (PGA)	1.641 g

FIELD INVESTIGATION

On January 7, 2022 the undersigned visited the site to mark the proposed boring locations and observe the various pavement distresses. At this time the client also indicated that shallow groundwater conditions were problematic, especially in Section K, and two borings were located in that section. The various pavement distresses were observed and borings P1 through P6 were located in their vicinity. Photograph 1, Plate 3 shows a large crack that crosses the driveway in the vicinity of boring P3. Photograph 2, Plate 3 shows a close-up of this crack. This crack is obviously a transverse crack, perpendicular to the centerline. It is generally acknowledged that transverse cracking is caused by shrinkage of the asphalt layer or reflection of a crack or joint underlying the pavement. It is not a load-related distress. The location of this crack in relation to the storm sewer utilities may be significant as the variation of materials in the subgrade between soil and utility may be a contributing factor of either thermal or reflective cracking. Photograph 3, Plate 4 is located near boring P2. This crack is very similar to the crack shown in Photograph 1, but it does not appear to be in the vicinity of a utility. However, it is near a watering station and it is unclear where the associated utility line is located. Photograph 4, Plate 4 was taken in the vicinity of boring P1 near the roadway intersection for the turn to the cortege area. The cracks in this area are smaller than the cracks shown in Photographs 1 and 3 and they are not as uniformly perpendicular to the roadway centerline. It may be concluded that these should still be considered transverse cracks, but the complexity of the intersection prevents the cracks from being perpendicular to the centerline even though they are perpendicular to the curbline.

Photographs 5 and 6, Plate 5, were taken in the vicinity of boring P4 on the west side of the assembly area. Site observations led to the conclusion that the asphalt distress in this area is a result of the curbline being shoved away from the sidewalk. The vertical displacement of the asphalt is not settlement of the low side but of heave on the high side caused by movement of the curb. Several site observations lead to the conclusion that the movement of the curb is likely caused by inadequate expansion joints. The movement is occurring only on the west side of the assembly area where higher daily temperatures can be expected due to afternoon sun. Additionally, the curb is a circle

with a circumference on the order of 800 feet. If sufficient expansion joints are not present to relieve the movement of that length of concrete, the integrity of a circular shape may only allow adequate expansion by bowing out one side.

Photograph 7, Plate 6 shows transverse cracks in the vicinity of boring P5 adjacent to Future Section D. These cracks are not as wide as the transverse cracks in the vicinity of Section E. However, there is water seeping up through the asphalt. Photograph 8, Plate 6 was taken west of Photograph 7 in the vicinity of boring P6. This photograph shows the pavement conditions with no transverse cracks.

On January 13 and 14, 2022 a geotechnical drilling crew performed the drilling and sampling of twenty-three borings at the site. The borings were placed strategically in various construction and remediation areas in an effort to obtain data for the engineering analysis and recommendations, as shown on the Plan of Borings, Plate 2. Standard Penetration Tests (SPT) were performed at selected intervals to determine the consistency of the subgrade soils. This testing consists of driving a 2.0-inch outside diameter split spoon sampler a total of 18.0 inches and recording the number of blows for each 6.0-inch increment. The number of blows required for the last two increments are summed to arrive at an SPT ("N") value. A value greater than 50 blows per foot is considered refusal. These values are used to correlate strength and settlement characteristics of the soils and to determine allowable bearing values of these materials. The soil samples obtained from this testing were visually classified in the field by an engineering technician. Logs illustrating the stratigraphy with depth and field tests are provided on Plates 7 through 29.

LABORATORY TESTING

Tests were performed on select samples to determine their physical properties and classification. Laboratory tests included moisture content determination, Atterberg limits, and mechanical grain size analyses. The following sections describe the results of these tests. Individual test results are shown in Appendix B.

Moisture Content Determination:

The moisture content tests were performed to determine the in-situ moisture content of the soil samples in boring C7 to aid in establishing soil physical properties for use in the engineering analysis. The results indicate moisture content ranging from 14.6% to 21.5% with an average of 17.9%. The results indicate that the soil moisture contents are likely well above the plastic limit of the soils.

Atterberg Limits:

Atterberg limit tests were performed on selected samples to aid in classification and to determine the potential volume change of the site soils. Based on the tests performed, the samples tested consisted of low to medium plastic clay (CL), low plasticity silty clay (CL-ML), low plasticity silt (ML), and non-plastic (NP) silt (ML). The cohesive samples had liquid limits of 21 to 33, with an average of 25, and plasticity index (PI) of 3 to 14, with an average of 8.

Mechanical Grain Size Analyses:

Mechanical grain size analyses (MGSA) were performed on selected samples found within the depths investigated to aid in classification and determine the amount of gravel, sand, and fines present in the soil. The results indicate that the site soils consist of clay (CL), silty clay (CL) with sand, sandy silty clay (CL-ML), sandy silt (ML), clayey sand (SC) with gravel, silty clayey sand (SC-SM), silty sand (SM), and sand (SP) with silt and gravel. These samples had up to 37.5% with an average of 7.3% gravel, between 11.6% and 61.6% with an average of 43.7% sand, and between 8.2% and 88.4% with an average of 49.0% passing the No. 200 sieve.

DISCUSSION OF STRATIGRAPHY

The results of the field and laboratory investigations allow the stratigraphy at each boring to be identified as shown on the boring logs. The stratum are generalized due to the variable nature of the alluvial soils. Specifically, changes in percentages of clay, silt, sand, and gravel that occur gradually in nature are represented by abrupt changes in the soil classifications shown on the logs. As a result, some minor discrepancy may exist between classifications given on the logs of borings and those provided as a result of laboratory testing.

The site stratigraphy consists primarily of soft to hard clay (CL) and silty clay (CL-ML) with some cohesive silt (ML) throughout the depths explored. Additionally, approximately one-third of the borings had cohesionless strata of very loose to medium dense clayey sand (SC) with gravel, silty clayey sand (SC-SM), sandy silt (ML), and sand (SP) with silt and gravel. Generally, these cohesionless strata were underlying cohesive strata at depths of 3.0 to 4.0 feet in the vicinity of Section K and the new service road with a single instance in Section A. While there is some correlation between the presence of the cohesionless strata and the presence of the perched water table there were also instances of cohesionless strata without water and clay strata with water.

The asphalt pavement in borings P1 through P6 was cored and the cores were returned to the lab for measurement. The asphalt cores were found to vary in thickness from 3.2 inches to 3.5 inches with an average of 3.3 inches. The pavement base was supposed to consist of 6.0 inches to 7.0 inches of soil-cement base. In borings P1 to P5 the field investigation found 10.0 inches to 14.0 inches, with an average of 11.5 inches, of cement stabilized base. However, no cement stabilized base was

observed in boring P6. The N-values of these samples verify these results. The N-values for borings P1 through P5 range from 28 to 80 with an average of 43 but the N-value from P6 is only 7. During visual classification the cement stabilized base samples were exposed to a weak acid to observe the pH reaction to cement. The sample from P3 did not react; the samples from borings P1, P2, and P4 had a weak reaction; the sample from P5 showed a moderate reaction; and the sample from P6 showed a strong reaction. These results indicate that while cement was used to stabilize the subgrade soils in order to create a base for the asphalt pavement, the cement was placed and/or mixed inconsistently. These inconsistencies may create joints in the base that could cause reflective cracking in the asphalt but appear sufficient to support the required traffic loads.

EARTHWORK

Significant earthwork is not anticipated as a portion of the construction for the proposed service road. However, this road may require more earthwork to support the anticipated construction traffic. The following should be considered as guidelines for the earthwork necessary for construction of the service road. However, they are not intended to be used as a specification for construction procedures or methods. Additionally, these recommendations should not be applicable to areas of the site that are not inclusive of the roadway areas.

The site is currently a field with mown grass and sparse trees. The existing vegetation and topsoil should be removed from within the proposed roadway areas. A stripping depth on the order of 6.0 inches should be anticipated across a majority of the site. Deeper stripping depths, up to several feet deep, may be required in low lying areas, along the paths of the existing drainage ditches, and beneath trees. After clearing, and any required cuts, the exposed subgrade should be proof rolled with a loaded, tandem-axle dump truck to identify soft, unstable soils. A minimum of two complete passes, defined by forward and backward movement over a specific area, should be performed and observed by the soils engineer or his representative. In areas that pass the proof roll, the top 8.0 inches of natural ground should be scarified, moisture conditioned to within two points of optimum, and compacted to 92% ASTM D 1557 prior to fill placement. Any areas failing the proof roll should be removed or stabilized prior to fill placement.

The required stabilization depth may vary based on site conditions and anticipated loads. Based on the results of the field investigation, the borings indicate that the site soils in the vicinity of the service road have a poor consistency in the top 3.0 feet to 5.0 feet and in two borings throughout the depths investigated. The designers and contractor should anticipate that the near surface soils will fail proof rolling, especially during wet or winter weather. A soil cement base was previously used for pavement sections at the site. However, based on the results of this investigation it may be concluded that the application and mixing of the cement with the soils was highly variable and not consistently effective. While this does not mean that the existing base is structurally inadequate, the

inconsistency may be a contributing factor to the transverse cracks occurring in the existing pavements. Thus, it is recommended that soil cement base is not used for the proposed service road. Undercut and backfill replacement should be anticipated as the primary construction method to support the pavement section. Traffic loads that consist primarily of passenger vehicles may typically be supported on 12.0 inches of compacted select fill. However, the use of a subgrade support fabric, such as Mirafi HP270 or equivalent, and an additional 18.0 inch bridge lift, compacted to best attainable density, should also be anticipated to achieve compaction in the select fill. Wet or winter weather and shallow perched water levels will aggravate the soft soil conditions. It is recommended that the owners, designers, and contractors minimize undercut through raising grades, timing construction for dry summer months, and maintaining the site in a well drained condition.

The on-site soils removed during undercut may be reused as select fill provided that they are moisture conditioned prior to placement and compaction. However, the lack of coarse fraction (sand or gravel) in a majority of the near surface soils may make them prone to loss of strength upon saturation. Thus, the designers and contractors may determine that the use of off-site materials is more cost effective for use as select fill. All select fill should consist of granular, non-expansive type soils with a plasticity index (PI) between 5 and 20, as per ACI 360R, such as clayey sand (SC) or clayey gravel (GC). Other locally available materials may be suitable but must be approved by the soils engineer prior to use. Fill materials should be placed within two percentage points of optimum moisture content in maximum 8.0-inch loose lifts and compacted to a minimum of 98% Standard compaction (ASTM D 698).

The compaction and moisture content of fill materials should be verified through field density tests per ASTM D 6938. One test per lift should be performed for every 5000 to 10,000 square feet for any drive areas. It would be prudent to require in the specifications the performance of Atterberg limits of fill materials during placement to ensure compliance with the criteria outlined herein as borrow pit soils may vary significantly across the pit.

Site grading and earthwork operations will be more difficult in wet or winter weather. The on-site silt and clay soils will absorb significant quantities of water which will require significant aeration and working to dry during the winter or wet weather. As an alternate, the contractor may elect to dry the soils using lime or fly ash worked into the wet soils. The amount of drying can be reduced by maintaining the site in a well drained condition during construction including not allowing water to stand or pond on areas of the exposed earthwork. In addition, during wet weather the upper limit on the moisture content should be raised to five percentage points over optimum moisture content, provided the fill meets the specified compaction and is firm and stable.

The alluvial soils encountered at the site should be excavated with normal tracked excavators. No conditions were encountered over the depths investigated that would indicate difficulty with excavations. Trench excavations for utilities should also be completed with normal excavation equipment. The near surface site soils may be prone to sloughing or cave-ins if allowed to saturate. Based on OSHA regulations (29 CFR 1926, Subpart P) regarding soil classification for trench excavations, the site soils encountered would best classify as Type C. In any case, OSHA regulations regarding shoring or benching of excavations should be considered during construction. Backfilling trench excavations should satisfy the criteria given previously, though ARDOT approved flowable fill may be used as an alternative for confined spaces provided it is allowed to properly cure.

FOUNDATIONS

The foundation analyses were based on AECI's current foundation design procedures using the N-values obtained from the borings. Based on the results of the borings and our in-house bearing capacity analyses, conventional shallow foundations will be feasible foundation options the structures associated with the new water well. An allowable bearing capacity of 1600 psf may be used for design of conventional foundations bearing at a minimum depth of 1.5 feet below the existing grade. For these conditions, the magnitude of settlement is estimated to be on the order of 1.0 inches total and 0.50 inch differential. A frost depth of 14.0 inches and a friction coefficient of 0.40 should be considered in design.

The performance of the foundation system will partially depend on the quality of construction. It would be prudent to have further evaluations by the soils engineer, or his representative, to verify that the design bearing value has been achieved in excavations. Furthermore, the condition of the subgrade should be evaluated to insure cleanliness and uniformity of bearing strata immediately prior to concrete placement. Bearing capacity can be verified by the use of a static cone penetrometer, or other acceptable means designated by the soils engineer.

The excavations for footings should be performed with equipment capable of providing a clean bearing surface. It would be ideal for the bottom 6.0 inches of the excavation be achieved with a smooth plate excavator, or hand labor. Reinforcing steel and concrete should be placed as soon as possible upon completion of the geotechnical representative evaluation, as described below. All debris, standing water and mud, including saturated soils, should be removed. In no instance should concrete be placed in frozen or saturated soils.

The bearing capacity and settlement discussions assume that the structural loadings are positioned such that a relatively uniform bearing pressure is exerted to the bearing strata. Eccentric, inclined or other loadings that result in a non-uniform bearing pressure will require further evaluation by this firm once specific loading conditions are established. Resisting uplift loads should consider the

weight of the footing and overlying soil backfill. A minimum factor of safety of 1.5 is recommended when calculating uplift resistance. For resistance of lateral forces, a net allowable passive resistance of 250 psf can be used for the portion of the footing extending below 1.5 feet.

DRIVES AND PARKING AREAS

The following pavement designs and recommendations are based on numerous reasonable assumptions concerning the pavement use, site conditions, and maintenance. The subgrade for the pavement structures should consist of 1.0 feet of select compacted fill underlain by an 18.0 inch bridgelift and a subgrade support fabric. Criteria outlined in the **EARTHWORK** section of this report should provide a subgrade CBR of 5 for the compacted select fill. The base material and surface material thicknesses and construction procedures are provided in the following sections.

Flexible Pavement:

Flexible pavement typically consists of asphalt cement hot mix (ACHM) as specified by Section 407 of the Standard Specifications for Highway Construction (2014 edition) as published by the Arkansas Department of Transportation (ARDOT). The design requirements for ACHM surface course: 12.5mm and 9.5mm are provided in Tables 407-1 and 407-2, respectively. ACHM is most commonly used for light to moderate traffic areas including straight drives and parking areas for relatively light vehicles. It should not be used in heavy traffic lanes where trucks turn, backup or pick up trash dumpsters. Based upon the subgrade CBR value of 5 for 1.0 feet of select fill with a bridgelift and subgrade support fabric, the following sections apply for light and heavy duty pavement sections. The recommended pavement structures are graphically presented on Plate 33.

LIGHT		HEAVY	
Material	Thickness (inches)	Material	Thickness (inches)
12.5 mm ACHM	2.0	12.5 mm ACHM	3.0
Class 7 Base	6.0	Class 7 Base	8.0

NOTES:

1) Class 7 - 90% crushed stone meeting ARDOT Table 303-1.
2) Compaction of ACHM surface course mat shall not be less than 92% of the theoretical design mix design and not less than 90% in any joint.
3) Base material compaction should not be less than 98% Modified (ASTM D 1557) compaction.

Rigid Pavement:

Rigid or Portland Cement Concrete (PCC) pavements consists of concrete materials and construction procedures as specified by Section 501 of the Standard Specifications for Highway Construction (2014 edition) as published by the Arkansas Department of Transportation (ARDOT). The material type and design requirements including admixtures, reinforcing, dowels, jointing, curing, and finish are provided therein. Approach slabs, truck or bus turning areas, and dumpster pads should be PCC

as a minimum. The following sections will apply for both the light and heavy duty pavement sections based upon the site subgrade CBR value of 5 and a modulus of subgrade reaction of 100 pci for 1.0 feet of select fill with a bridgelift and subgrade support fabric. The recommended pavement structures are graphically presented on Plate 33.

LIGHT		HEAVY	
Material	Thickness (inches)	Material	Thickness (inches)
PCC	5.0	PCC	7.0
Class 7 Base	4.0	Class 7 Base	6.0

NOTES:

1) Class 7 - 90% crushed stone meeting ARDOT Table 303-1.
2) PCC strength to be 4000 psi at 28 days.
3) PCC to be entrained with 5% air.
4) Load transfer, dowels, and joints per ACI, ARDOT or PCA guidelines.
5) PCC should be increased to 10.0 inches for dumpster approaches and pads.

Pavement Performance/Maintenance:

The long term pavement performance will be directly related to several factors such as adequate edge drainage and surface drainage which does not allow water to accumulate on the pavement surface or behind the curbs and pavement edges. All pavement joints must be sealed and should be placed parallel to the overall site drainage direction. All irrigation, water, and other utility lines should be carefully monitored to insure they do not contribute to premature pavement failure by allowing water to migrate onto or under the pavements. Adequate quality control testing including proof rolling, compaction testing, and thickness testing of base and ACHM is critical to successful long term pavement performance. In addition, pavements will require regular maintenance such as periodic surface and crack sealing to prolong the desired performance and life.

Pavement Remediation:

As previously discussed, two distinct areas of pavement distress were observed during the site visit. The first observed pavement distress include transverse cracking in the roadways between Section E and Section K as well as between Section D and Section G. Transverse cracking is caused by shrinkage of the asphalt layer, possibly due to low temperatures or premature binder hardening during construction, or reflection of a crack of joints underlying the pavement. It is not a load-related distress. A single causative factor of the various transverse cracks was not determined. However, contributing factors may include variability in cement stabilize subgrades creating cracks that could reflect into the asphalt, reflective cracking associated with poor or variable backfill around utility crossings, or asphalt binder problems during construction. Neither asphalt thickness nor cement stabilized base strength should be considered a contributing factor.

Since transverse cracks are not generally considered a structural issue, their repair is generally an issue of prevention of further distress. Moisture infiltration that can cause subgrade softening and propagation of additional cracks can generally be prevented by cleaning, filling, sealing, and regular maintenance. The Federal Highway Administration (FHWA) publication FHWA-RD-99-147 "Materials and Procedures for Sealing and Filling Cracks in Asphalt-Surfaced Pavements - Manual of Practice" may be downloaded from the internet and should be used to create a repair and maintenance plan for the transverse cracks. Depending on the activity (working vs. non-working), width, and deterioration of the various cracks, specific repairs may include routing/sawcutting, cleaning, filling, sealing, and regular maintenance. As numerous proprietary filling and sealing products are available, a licenced, bonded, and insured pavement contractor should have experience in crack repair with the chosen system. Some consideration may also be given to more extensive repair to the two larger cracks in the vicinity of borings P2 and P3, such as remove and replace or overlay. FHWA-RD-99-147 should also be consulted in this determination.

The second pavement distress observed during the site visit was the shoving of the asphalt pavement adjacent to the concrete curb on the west side of the assembly area. As previously discussed, the undersigned has concluded that this distress is being caused by movement of the concrete curb as a result of insufficient expansion joints in conjunction with the geometric constraints of a circle during large thermal expansions of the concrete. It may be desirable to repair the asphalt for purely aesthetic reasons. However, repairs are not required for any structural reasons. Additionally, no repairs will be required for the base or subgrade in this area. Aesthetic repair of the asphalt may be considered to level the areas of differential movement through grinding, overlay, patching, or a combination of these.

The more critical discussion is about the curb. As with the asphalt, the curb is structurally sound but aesthetically problematic. Prior to a determination of possible repairs, it should be determined if the curb continues to move and if so, how much. Online research yielded very little information on expansion of curbs. Several different specifications were found to have expansion joint spacings on the order of 45.0 to 60.0 feet for, presumably, straight curbs. The ARDOT Standard Specifications for Highway Construction (2014) only specifies expansion joints be located at stationary structures such as inlets and to coincide with those of the pavement. However, no direction has been found as to the required expansion joint spacing for a circular curb without any breaks. As the curbs were placed prior to the sidewalk it is unclear what the spacing for expansion joints is at the site. A typical expansion joint spacing of 45.0 feet would result in approximately eighteen joints over the circle circumference of 800 feet. With approximately one-eight inch of movement for each joint an expansion capacity of the entire curb would then be on the order of 2.25 inches.

Project documentation indicates that the curb was likely constructed in January or February, 2011, with temperatures on the order of 40°F to 50°F. The asphalt was placed in April of 2011 but the sidewalks weren't constructed until September of 2011 with an ambient air temperature of ±75°F. The theoretical thermal expansion of concrete is dependent on the temperature differential. For the sidewalk the temperature differential between it's placement temperature and a maximum summer temperature may be on the order of 30°F to 40°F. However, for the curb, that temperature differential may be on the order of 70°F or more. For 800 feet of concrete with a temperature differential of 30°F to 40°F expansion could be on the order of 1.0 to 3.0 inches. However, when the temperature differential is increased to 70°F the expansion could be on the order of 2.5 to 5.0 inches. Thus, curb repair would require increasing the expansion joints in the existing curb, replacing the curb during warmer temperatures, or a combination of the two.

QUALITY CONTROL

In order to achieve quality workmanship to help ensure that the specified end results are achieved, and to make certain that the continued satisfactory performance of the project is assured, extensive quality control and monitoring of the work performed should be required. This should include a qualified quality control agency, with a technician serving in a surveillance and documentation capacity as inspector for the designers, owners, and builders, to provide the assurance for achieving the specified compliance. The technician should be a prepared to perform the tests on all items of work daily and/or routinely as may be required. The quality control testing agency should be given responsibility in the testing and evaluation of the work, under the guidance of the Owner's representative, but not to the extent of negating the contractual documents or the obligation of additional construction funds. Finally, the ASTM standard testing procedures should be used to the fullest extent possible in the quality control program, supplemented by various other state or local specifications on some items of the work when applicable.

CONCLUSIONS AND RECOMMENDATIONS

As a result of this geotechnical investigation, the following recommendations are offered for consideration:

1. As previously discussed, conventional footings bearing on natural ground are suitable foundations options for the structure associated with the well. It is recommended that the foundations be designed in accordance with the necessary structural and/or architectural requirements determined by the designers. The allowable bearing capacity for the conventional footings is 1600 psf on natural ground at a depth of 1.5 feet below the existing grade.
2. All fill shall be placed in 8.0-inch thick lifts and be compacted within two percentage points of optimum moisture content to 98% Standard Proctor density as per ASTM D 698. The select fill shall be non-expansive, granular type soils with a PI between 5 and 20.

3. An extensive groundwater monitoring program should be developed with a study length of at least one year. Data developed from the monitoring program may then be used to create a site dewatering plan.
4. Perimeter surface drainage should be assured around the exterior of the structures, including pavements, to intercept and drain surface runoff water from the near surface and foundation supporting soils. It would also be a prudent measure to slope backfill soils away from foundations walls.
5. FHWA-RD-99-147 should also be consulted to determine crack repairs for the transverse cracks in the roadways. Aesthetic repairs maybe considered, but are not structurally necessary, for the curb and asphalt distress on the west side of the assembly area.
6. Quality control testing should be utilized in the construction of the foundation, undercutting, fill placement, and pavement construction with adequate testing to verify that the design requirements have been achieved.
7. Geotechnical engineering services by a qualified firm are recommended during the foundation construction phase so that adequate compensation can be made for conditions that may occur which differ significantly from those assumed as a result of this investigation.
8. Other recommendations are given throughout the text of this report.

LIMITATIONS

The boring logs shown in this report contain information related to the types of soil or rock encountered at specific locations and times and show lines delineating the interface between these materials, as well as results of tests performed in the laboratory on representative samples. The logs also contain our field technician's interpretation of conditions that are believed to exist in those depth intervals between the actual samples taken. Therefore, these boring logs contain both factual and interpretative information. It is not warranted that these logs are representative of subsurface conditions at other locations and times.

The analyses, conclusions, and recommendations contained in this report are based on site conditions as they existed at the time of our field investigation and further on the assumption that the exploratory borings are representative of the subsurface conditions throughout the site. If, during construction, different subsurface conditions from those encountered in our borings are observed, or appear to be present beneath excavations, we must be advised promptly so that we can review these conditions and provide new recommendations as becomes necessary. Recognize that both natural and manmade events may have changed site conditions since issuance of this report and further review may result. If after submission of this report structural loads or finished grades are changed from those that were assumed, we urge that we be promptly informed, and retained to review our report to determine the applicability of the conclusions and recommendations, considering the changed conditions and/or time lapse. Further, we request that our firm be retained to review

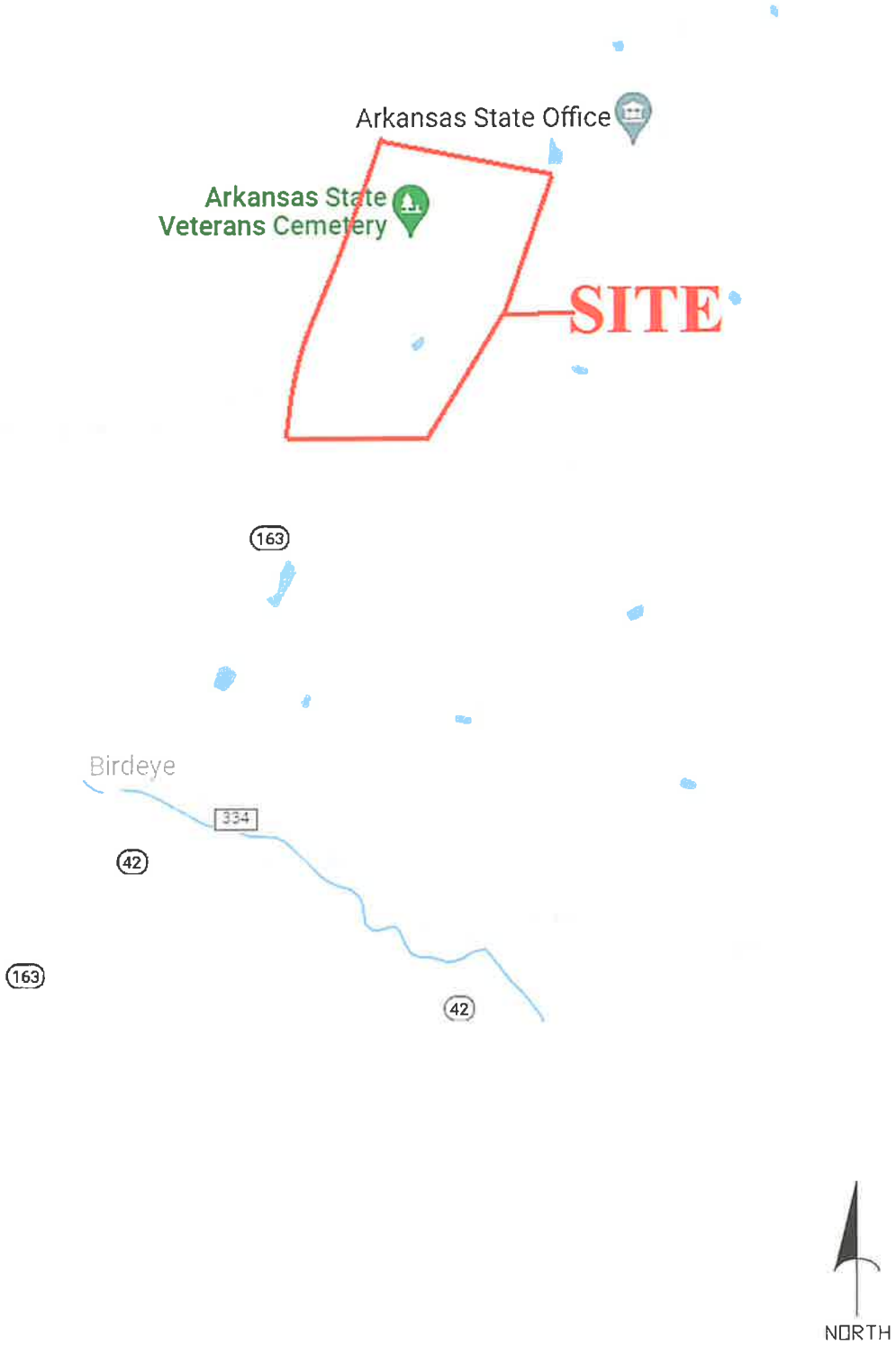
those portions of the plans and specifications for this particular project that pertain to earthwork and foundations as a means to determine whether the plans and specifications are consistent with the recommendations contained in the report. The conclusions and recommendations contained herein are based on several assumptions regarding grades, anticipated loads, and location of the structure. It is understood that specific information was unavailable at this early stage of planning. It is strongly recommended that this firm be provided a copy of the plans for review upon completion. An in-depth review is considered necessary to verify the recommendations included in the text and their suitability in the final design.

It should be understood that there is the possibility that even with the proper application of current engineering principles, conditions may exist on the site that could not be identified within the scope of this investigation or which were not reasonably identifiable from the available information. The conclusions and recommendations in this report contain all the limitations inherent to the principles and practice of geotechnical engineering. AECI has not performed any observations, investigation, study, or testing that is not specifically listed in the scope of services. Thus, AECI shall not be liable for failing to discover any condition whose discovery required the performance of services outside of the scope of services provided in our proposal.

* * * * *

APPENDIX A

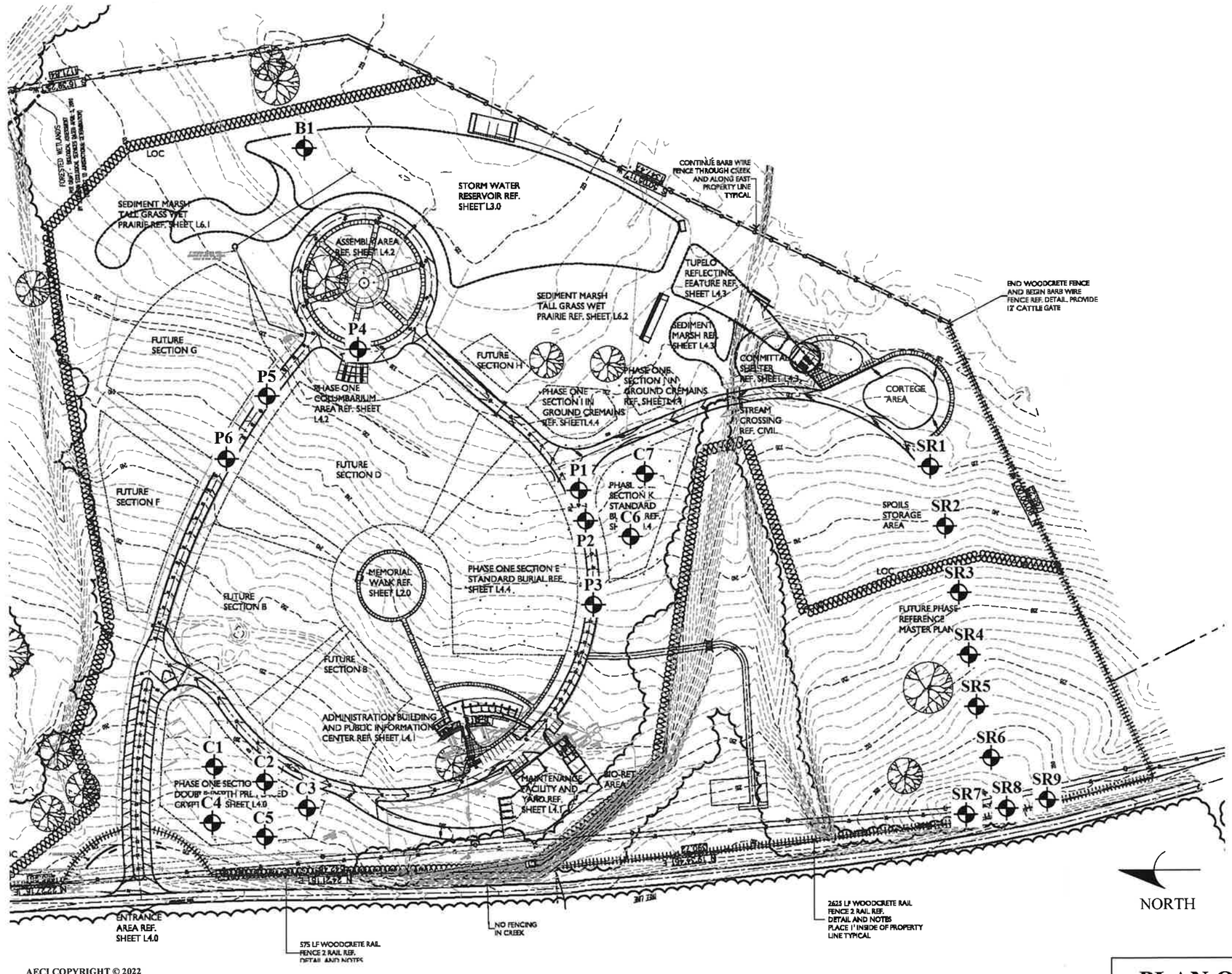
PLATES



VICINITY MAP

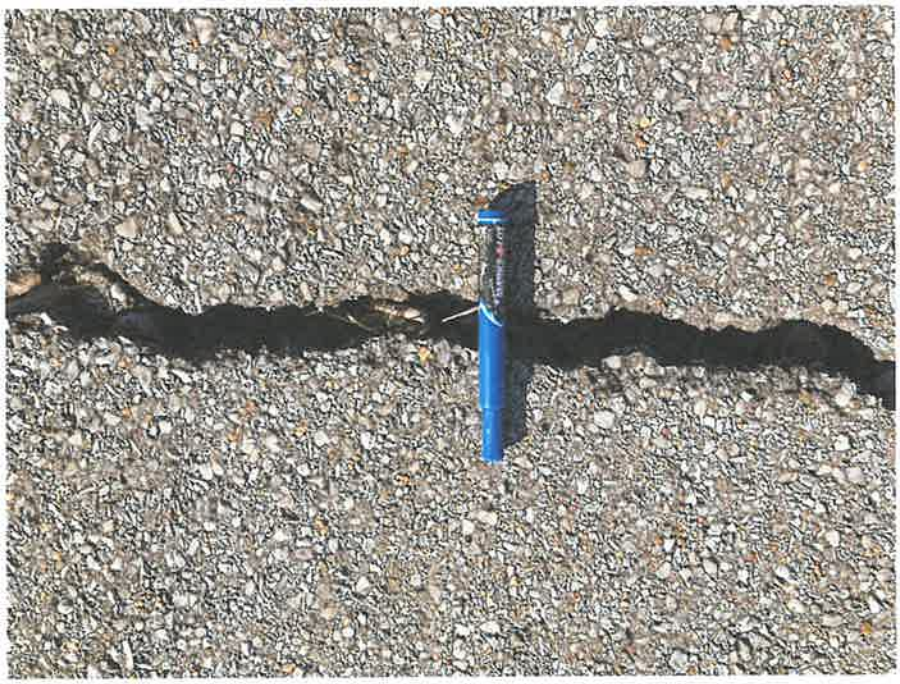
BIRDEYE, ARKANSAS

NOT DRAWN TO SCALE.



PLAN OF BORINGS

PHOTOGRAPH NO. 1:
This photograph is taken near Boring P3 looking towards Section E. The transverse crack in the pavement can be seen immediately south of the stormwater inlets along the roadway.



PHOTOGRAPH NO. 2:
This photograph is a close-up of the pavement distress shown in Photograph 1 and shows the crack width.

PHOTOGRAPH NO. 3:
This photograph shows the transverse crack near Boring P2 looking north. It is very similar to the crack shown in Photograph 1 except it is not in the vicinity of an obvious utility.

PHOTOGRAPH NO. 4:
This photograph is taken in the vicinity of Boring P3 looking east. The cracks in this area are smaller than those shown in Photographs 1 and 3. Additionally, they are not as uniformly perpendicular to the roadway centerline, possibly due to the complex geometry of the intersection.

PHOTOGRAPH NO. 5:
This photograph shows the pavement and curb distress on the west side of the assembly area looking south. This photograph shows the movement of the curb away from the sidewalk and the shoving of the asphalt parallel to the curbline.

PHOTOGRAPH NO. 6:
This photograph is also of the pavement distress on the west side of the assembly area. It shows the vertical displacement of the asphalt that is likely a result of shoving as the curb displaces away from the sidewalk.

PHOTOGRAPH NO. 7:
This photograph shows the asphalt distress in the vicinity of Boring P5 looking towards Future Section D. The transverse cracks in this area are not as wide as near Section E, they do have water seeping up through the asphalt.

PHOTOGRAPH NO. 8:
This photograph is taken in the vicinity of Boring P6 looking west. It illustrates an area of pavement without transverse cracks.

ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
BORING NO: C1

FOR: ECOLOGICAL DESIGN GROUP, INC.
LOCATION: SEE PLAN OF BORINGS

DATE: 01/13/22 **JOB NO:** 17011 **BORING TYPE:** AUGER W/SPT

DRILLER: J. SUTTON **GEOTECHNICIAN:** J. SUTTON **GROUND ELEVATION:** 263.0± msl
SIMCO 2400

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	8		7.0 INCHES TOPSOIL MEDIUM STIFF TO STIFF MOIST BROWN SILTY CLAY (CL) PP = 1.00 KSF
	P2	9		CONTINUES SILTY (CL) PP = 1.00 KSF
5	P3	11		STIFF MOIST BROWN SILTY CLAY (CL-ML) PP = 1.25 KSF
	P4	11		CONTINUES SILTY (CL-ML) PP = 1.25 KSF
10	P5	10		CONTINUES SILTY (CL-ML) PP = 1.00 KSF
				BOTTOM OF HOLE AT 11.5 FEET. BORING REMAINED OPEN. NO WATER WAS ENCOUNTERED IN THIS BORING.
15				
20				
25				

ANDERSON ENGINEERING CONSULTANTS, INC.
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LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
BORING NO: C2

FOR: ECOLOGICAL DESIGN GROUP, INC.
LOCATION: SEE PLAN OF BORINGS

DATE: 01/13/22 **JOB NO:** 17011 **BORING TYPE:** AUGER W/SPT

DRILLER: J. SUTTON
SIMCO 2400
GEOTECHNICIAN: J. SUTTON **GROUND ELEVATION:** 262.5± msl

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	18		4.0 INCHES TOPSOIL STIFF TO VERY STIFF MOIST BROWN SILTY CLAY (CL) PP = 2.00 KSF
	P2	10		CONTINUES SILTY (CL) PP = 1.00 KSF
5	P3	12		CONTINUES SILTY (CL) PP = 1.25 KSF
	P4	10		CONTINUES SILTY (CL) PP = 1.00 KSF
10	P5	11		CONTINUES (CL) - BECOMES SANDY PP = 1.25 KSF
				BOTTOM OF HOLE AT 11.5 FEET. BORING REMAINED OPEN. NO WATER WAS ENCOUNTERED IN THIS BORING.
15				
20				
25				

ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
FOR: ECOLOGICAL DESIGN GROUP, INC.

BORING NO: C3
LOCATION: SEE PLAN OF BORINGS

DATE: 01/13/22 **JOB NO:** 17011 **BORING TYPE:** AUGER W/SPT

DRILLER: J. SUTTON
SIMCO 2400
GEOTECHNICIAN: J. SUTTON
GROUND ELEVATION: 262.5± msl

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	7		4.0 INCHES TOPSOIL MEDIUM STIFF TO STIFF MOIST BROWN SILTY CLAY (CL) PP = 1.75 KSF
	P2	7		CONTINUES SILTY (CL) PP = 1.75 KSF
5	P3	9		CONTINUES SILTY (CL) PP = 2.00 KSF
	P4	9		CONTINUES SILTY (CL) PP = 2.00 KSF
10	P5	9		CONTINUES SILTY (CL) PP = 2.00 KSF
				BOTTOM OF HOLE AT 11.5 FEET. BORING REMAINED OPEN. NO WATER WAS ENCOUNTERED IN THIS BORING.
15				
20				
25				

ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
BORING NO: C4

FOR: ECOLOGICAL DESIGN GROUP, INC.
LOCATION: SEE PLAN OF BORINGS

DATE: 01/13/22 **JOB NO:** 17011 **BORING TYPE:** AUGER W/SPT

DRILLER: J. SUTTON
SIMCO 2400
GEOTECHNICIAN: J. SUTTON **GROUND ELEVATION:** 267.0± msl

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	5		8.0 INCHES TOPSOIL SOFT TO MEDIUM STIFF MOIST BROWN SILTY CLAY (CL) PP = 0.50 KSF
	P2	3		CONTINUES SILTY (CL) PP = 0.50 KSF
5	P3	8		CONTINUES SILTY (CL) PP = 1.00 KSF
	P4	8		CONTINUES (CL) - BECOMES SANDY PP = 1.00 KSF
10	P5	6		CONTINUES (CL) - BECOMES SILTY PP = 0.75 KSF
				BOTTOM OF HOLE AT 11.5 FEET. BORING REMAINED OPEN. NO WATER WAS ENCOUNTERED IN THIS BORING.
15				
20				
25				

ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
BORING NO: C5

FOR: ECOLOGICAL DESIGN GROUP, INC.
LOCATION: SEE PLAN OF BORINGS

DATE: 01/13/22 **JOB NO:** 17011 **BORING TYPE:** AUGER W/SPT

DRILLER: J. SUTTON
SIMCO 2400
GEOTECHNICIAN: J. SUTTON **GROUND ELEVATION:** 266.0± msl

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	24		7.0 INCHES TOPSOIL MEDIUM STIFF TO VERY STIFF MOIST BROWN SILTY CLAY (CL) PP = 2.50 KSF
	P2	9		CONTINUES SILTY (CL) PP = 1.00 KSF
5	P3	7		CONTINUES SILTY (CL) PP = 0.75 KSF
	P4	11		CONTINUES (CL) - BECOMES SANDY PP = 1.25 KSF
10	P5	9		LOOSE WET BROWN CLAYEY SAND (SC) WITH GRAVEL
				BOTTOM OF HOLE AT 11.5 FEET. BORING REMAINED OPEN. NO WATER WAS ENCOUNTERED IN THIS BORING.
15				
20				
25				

ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
FOR: ECOLOGICAL DESIGN GROUP, INC.

BORING NO: C6
LOCATION: SEE PLAN OF BORINGS

DATE: 01/13/22 **JOB NO:** 17011 **BORING TYPE:** AUGER W/SPT

DRILLER: J. SUTTON
SIMCO 2400
GEOTECHNICIAN: J. SUTTON
GROUND ELEVATION: 236.5± msl

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	12		6.0 INCHES TOPSOIL MEDIUM STIFF TO STIFF MOIST BROWN SILTY CLAY (CL) PP = 1.25 KSF
	P2	6		CONTINUES (CL) - BECOMES SANDY PP = 0.75 KSF
5	P3	13		CONTINUES (CL) - BECOMES SILTY, WET AND BROWNISH GRAY PP = 1.50 KSF
	P4	8		CONTINUES SILTY (CL) PP = 1.00 KSF
10	P5	10		CONTINUES SILTY (CL) PP = 1.00 KSF
				BOTTOM OF HOLE AT 11.5 FEET. BORING REMAINED OPEN. WATER ENCOUNTERED AT 5.0 FEET DURING DRILLING. WATER ENCOUNTERED AT 7.0 FEET UPON COMPLETION OF DRILLING.
15				
20				
25				

ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
FOR: ECOLOGICAL DESIGN GROUP, INC.

BORING NO: C7
LOCATION: SEE PLAN OF BORINGS

DATE: 01/13/22 **JOB NO:** 17011
BORING TYPE: AUGER W/SPT

DRILLER: J. SUTTON
SIMCO 2400
GEOTECHNICIAN: J. SUTTON
GROUND ELEVATION: 234.5± msl

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	16		6.0 INCHES TOPSOIL VERY STIFF MOIST BROWN SILTY CLAY (CL) PP = 1.75 KSF
	P2	11		LOOSE TO MEDIUM DENSE MOIST BROWN SILTY CLAYEY SAND (SC-SM)
5	P3	8		CONTINUES (SC-SM) - BECOMES WET AND BROWNISH GRAY
	P4	9		LOOSE TO MEDIUM DENSE WET BROWNISH GRAY SANDY SILT (ML)
10	P5	10		CONTINUES SANDY (ML)
15				BOTTOM OF HOLE AT 11.5 FEET. BORING REMAINED OPEN. WATER ENCOUNTERED AT 5.0 FEET DURING DRILLING. WATER ENCOUNTERED AT 3.5 FEET UPON COMPLETION OF DRILLING.
20				
25				

ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
FOR: ECOLOGICAL DESIGN GROUP, INC.

BORING NO: SR1
LOCATION: SEE PLAN OF BORINGS

DATE: 01/13/22 **JOB NO:** 17011 **BORING TYPE:** AUGER W/SPT

DRILLER: J. SUTTON
SIMCO 2400
GEOTECHNICIAN: J. SUTTON
GROUND ELEVATION: 235.5± msl

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	6		5.0 INCHES TOPSOIL MEDIUM STIFF TO STIFF MOIST DARK BROWN SILTY CLAY (CL) PP = 0.75 KSF
	P2	7		CONTINUES SILTY (CL) - BECOMES BROWNISH GRAY PP = 0.75 KSF
5	P3	9		CONTINUES SILTY (CL) PP = 1.00 KSF
				BOTTOM OF HOLE AT 6.5 FEET. BORING REMAINED OPEN. NO WATER ENCOUNTERED IN THIS BORING.
10				
15				
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ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
FOR: ECOLOGICAL DESIGN GROUP, INC.

BORING NO: SR2
LOCATION: SEE PLAN OF BORINGS

DATE: 01/13/22 **JOB NO:** 17011 **BORING TYPE:** AUGER W/SPT

DRILLER: J. SUTTON
SIMCO 2400
GEOTECHNICIAN: J. SUTTON
GROUND ELEVATION: 241.0± msl

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	4		6.0 INCHES TOPSOIL SOFT TO MEDIUM STIFF MOIST BROWN SILTY CLAY (CL) PP = 0.50 KSF
	P2	4		VERY LOOSE TO LOOSE MOIST BROWNISH GRAY SILTY SAND (SM)
5	P3	6		CONTINUES (SM) - BECOMES WET
				BOTTOM OF HOLE AT 6.5 FEET. BORING REMAINED OPEN. WATER ENCOUNTERED AT 5.0 FEET DURING DRILLING.
10				
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20				
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ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
FOR: ECOLOGICAL DESIGN GROUP, INC.

BORING NO: SR3
LOCATION: SEE PLAN OF BORINGS

DATE: 01/14/22 **JOB NO:** 17011 **BORING TYPE:** AUGER W/SPT

DRILLER: J. SUTTON
SIMCO 2400
GEOTECHNICIAN: J. SUTTON
GROUND ELEVATION: 248.5± msl

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	6		8.0 INCHES TOPSOIL MEDIUM STIFF MOIST BROWN SILTY CLAY (CL) PP = 0.75 KSF
	P2	6		CONTINUES SILTY (CL) PP = 0.75 KSF
5	P3	7		CONTINUES SILTY (CL) PP = 0.75 KSF
				BOTTOM OF HOLE AT 6.5 FEET. BORING REMAINED OPEN. NO WATER ENCOUNTERED IN THIS BORING.
10				
15				
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ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
BORING NO: SR4

FOR: ECOLOGICAL DESIGN GROUP, INC.
LOCATION: SEE PLAN OF BORINGS

DATE: 01/14/22 **JOB NO:** 17011 **BORING TYPE:** AUGER W/SPT

DRILLER: J. SUTTON **GEOTECHNICIAN:** J. SUTTON **GROUND ELEVATION:** 253.5± msl
SIMCO 2400

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	4		10.0 INCHES TOPSOIL SOFT TO MEDIUM STIFF MOIST BROWN SILTY CLAY (CL) PP = 0.50 KSF
	P2	6		CONTINUES SILTY (CL) PP = 0.75 KSF
5	P3	19		MEDIUM DENSE MOIST BROWN CLAYEY SAND (SC) WITH GRAVEL
				BOTTOM OF HOLE AT 6.5 FEET. BORING REMAINED OPEN. NO WATER ENCOUNTERED IN THIS BORING.
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ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
BORING NO: SR5

FOR: ECOLOGICAL DESIGN GROUP, INC.
LOCATION: SEE PLAN OF BORINGS

DATE: 01/14/22 **JOB NO:** 17011 **BORING TYPE:** AUGER W/SPT

DRILLER: J. SUTTON
SIMCO 2400
GEOTECHNICIAN: J. SUTTON **GROUND ELEVATION:** 258.5± msl

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	6		6.0 INCHES TOPSOIL MEDIUM STIFF MOIST BROWN SILTY CLAY (CL) PP = 0.75 KSF
	P2	5		CONTINUES SILTY (CL) PP = 0.50 KSF
5	P3	6		LOOSE MOIST BROWN CLAYEY SAND (SC) WITH GRAVEL
				BOTTOM OF HOLE AT 6.5 FEET. BORING REMAINED OPEN. NO WATER ENCOUNTERED IN THIS BORING.
10				
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ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
FOR: ECOLOGICAL DESIGN GROUP, INC.

BORING NO: SR6
LOCATION: SEE PLAN OF BORINGS

DATE: 01/14/22 **JOB NO:** 17011 **BORING TYPE:** AUGER W/SPT

DRILLER: J. SUTTON
SIMCO 2400
GEOTECHNICIAN: J. SUTTON
GROUND ELEVATION: 262.5± msl

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	11		6.0 INCHES TOPSOIL STIFF MOIST BROWN SILTY CLAY (CL-ML) PP = 1.25 KSF
	P2	9		CONTINUES SILTY (CL-ML) PP = 1.00 KSF
5	P3	13		MEDIUM DENSE MOIST BROWN SILTY CLAYEY SAND (SC-SM)
				BOTTOM OF HOLE AT 6.5 FEET. BORING REMAINED OPEN. NO WATER ENCOUNTERED IN THIS BORING.
10				
15				
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ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
BORING NO: SR7

FOR: ECOLOGICAL DESIGN GROUP, INC.
LOCATION: SEE PLAN OF BORINGS

DATE: 01/14/22 **JOB NO:** 17011 **BORING TYPE:** AUGER W/SPT

DRILLER: J. SUTTON **GEOTECHNICIAN:** J. SUTTON **GROUND ELEVATION:** 266.5± msl
SIMCO 2400

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	5		7.0 INCHES TOPSOIL MEDIUM STIFF MOIST BROWN SILTY CLAY (CL) PP = 0.50 KSF
	P2	32		HARD MOIST BROWN SILT (ML) PP = 3.25 KSF
5	P3	34		HARD MOIST BROWN SILTY CLAY (CL) PP = 3.50 KSF
				BOTTOM OF HOLE AT 6.5 FEET. BORING REMAINED OPEN. NO WATER ENCOUNTERED IN THIS BORING.
10				
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ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
BORING NO: SR8

FOR: ECOLOGICAL DESIGN GROUP, INC.
LOCATION: SEE PLAN OF BORINGS

DATE: 01/14/22 **JOB NO:** 17011 **BORING TYPE:** AUGER W/SPT

DRILLER: J. SUTTON **GEOTECHNICIAN:** J. SUTTON **GROUND ELEVATION:** 265.5± msl
SIMCO 2400

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	5		7.0 INCHES TOPSOIL MEDIUM STIFF TO STIFF MOIST BROWN SILTY CLAY (CL) PP = 0.50 KSF
	P2	9		CONTINUES SILTY (CL) PP = 1.00 KSF
5	P3	14		CONTINUES SILTY (CL) PP = 1.50 KSF
				BOTTOM OF HOLE AT 6.5 FEET. BORING REMAINED OPEN. NO WATER ENCOUNTERED IN THIS BORING.
10				
15				
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ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
FOR: ECOLOGICAL DESIGN GROUP, INC.
BORING NO: SR9
LOCATION: SEE PLAN OF BORINGS
DATE: 01/14/22
JOB NO: 17011
BORING TYPE: AUGER W/SPT
DRILLER: J. SUTTON
SIMCO 2400
GEOTECHNICIAN: J. SUTTON
GROUND ELEVATION: 262.0± msl

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	8		5.0 INCHES TOPSOIL MEDIUM STIFF MOIST BROWN SILTY CLAY (CL) PP = 1.00 KSF
	P2	16		MEDIUM DENSE MOIST BROWN CLAYEY SAND (SC) WITH GRAVEL
5	P3	27		MEDIUM DENSE WET BROWN SAND (SP) WITH SILT AND GRAVEL
				BOTTOM OF HOLE AT 6.5 FEET. BORING REMAINED OPEN. WATER ENCOUNTERED AT 5.0 FEET DURING DRILLING.
10				
15				
20				
25				

ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
FOR: ECOLOGICAL DESIGN GROUP, INC.

BORING NO: P1
LOCATION: SEE PLAN OF BORINGS

DATE: 01/13/22 **JOB NO:** 17011
BORING TYPE: AUGER W/SPT

DRILLER: J. SUTTON
SIMCO 2400
GEOTECHNICIAN: J. SUTTON
GROUND ELEVATION: 234.0± msl

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	36		3.4 INCHES ASHPALT/12.0 INCHES CEMENT STABILIZED BASE WEAK REACTION TO ACID
	P2	14		STIFF MOIST BROWNISH GRAY SILTY CLAY (CL-ML) PP = 1.50 KSF
5	P3	9		CONTINUES SILTY (CL-ML) - BECOMES WET AND BROWN PP = 1.00 KSF
				BOTTOM OF HOLE AT 6.5 FEET. BORING REMAINED OPEN. WATER ENCOUNTERED AT 5.0 FEET DURING DRILLING. WATER ENCOUNTERED AT 3.0 FEET UPON COMPLETION OF DRILLING.
10				
15				
20				
25				

ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
FOR: ECOLOGICAL DESIGN GROUP, INC.

BORING NO: P2
LOCATION: SEE PLAN OF BORINGS

DATE: 01/13/22 **JOB NO:** 17011
BORING TYPE: AUGER W/SPT

DRILLER: J. SUTTON
SIMCO 2400
GEOTECHNICIAN: J. SUTTON
GROUND ELEVATION: 236.0± msl

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	30		3.2 INCHES ASHPALT/10.0 INCHES CEMENT STABILIZED BASE WEAK REACTION TO ACID
	P2	15		MEDIUM STIFF TO VERY STIFF MOIST BROWN SILTY CLAY (CL) PP = 1.50 KSF
5	P3	7		CONTINUES SILTY (CL) - BECOMES WET PP = 0.75 KSF
				BOTTOM OF HOLE AT 6.5 FEET. BORING REMAINED OPEN. WATER ENCOUNTERED AT 5.0 FEET DURING DRILLING.
10				
15				
20				
25				

ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
FOR: ECOLOGICAL DESIGN GROUP, INC.

BORING NO: P3
LOCATION: SEE PLAN OF BORINGS

DATE: 01/13/22 **JOB NO:** 17011
BORING TYPE: AUGER W/SPT

DRILLER: J. SUTTON
SIMCO 2400
GEOTECHNICIAN: J. SUTTON
GROUND ELEVATION: 240.5± msl

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	80		3.5 INCHES ASHPALT/14.0 INCHES CEMENT STABILIZED BASE NO REACTION TO ACID
	P2	13		MEDIUM DENSE MOIST BROWN SILTY SAND (SM)
5	P3	12		STIFF WET BROWNISH GRAY SILTY CLAY (CL) PP = 1.25 KSF
				BOTTOM OF HOLE AT 6.5 FEET. BORING REMAINED OPEN. WATER ENCOUNTERED AT 5.0 FEET DURING DRILLING.
10				
15				
20				
25				

ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
FOR: ECOLOGICAL DESIGN GROUP, INC.

BORING NO: P4
LOCATION: SEE PLAN OF BORINGS

DATE: 01/13/22 **JOB NO:** 17011
BORING TYPE: AUGER W/SPT

DRILLER: J. SUTTON
SIMCO 2400
GEOTECHNICIAN: J. SUTTON
GROUND ELEVATION: 230.5± msl

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	28		3.3 INCHES ASHPALT/10.0 INCHES CEMENT STABILIZED BASE WEAK REACTION TO ACID
	P2	9		STIFF TO VERY STIFF MOIST BROWNISH GRAY SILTY CLAY (CL) PP = 1.00 KSF
5	P3	19		CONTINUES SILTY (CL) - BECOMES GRAY PP = 2.00 KSF
				BOTTOM OF HOLE AT 6.5 FEET. BORING REMAINED OPEN. NO WATER ENCOUNTERED IN THIS BORING.
10				
15				
20				
25				

ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
FOR: ECOLOGICAL DESIGN GROUP, INC.

BORING NO: P5
LOCATION: SEE PLAN OF BORINGS

DATE: 01/13/22 **JOB NO:** 17011
BORING TYPE: AUGER W/SPT

DRILLER: J. SUTTON
SIMCO 2400
GEOTECHNICIAN: J. SUTTON
GROUND ELEVATION: 235.5± msl

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	42		3.2 INCHES ASHPALT/12.0 INCHES CEMENT STABILIZED BASE MODERATE REACTION TO ACID
	P2	16		VERY STIFF MOIST BROWN SILT (ML) PP = 1.75 KSF
5	P3	16		VERY STIFF MOIST BROWISH GRAY SANDY CLAY (CL) PP = 1.75 KSF
				BOTTOM OF HOLE AT 6.5 FEET. BORING REMAINED OPEN. NO WATER ENCOUNTERED IN THIS BORING.
10				
15				
20				
25				

ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
FOR: ECOLOGICAL DESIGN GROUP, INC.

BORING NO: P6
LOCATION: SEE PLAN OF BORINGS

DATE: 01/13/22 **JOB NO:** 17011
BORING TYPE: AUGER W/SPT

DRILLER: J. SUTTON
SIMCO 2400
GEOTECHNICIAN: J. SUTTON
GROUND ELEVATION: 242.5± msl

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	7		3.3 INCHES ASHPALT/NO MEASURABLE BASE STRONG REACTION TO ACID MEDIUM STIFF TO STIFF MOIST BROWN SILTY CLAY (CL-ML) PP = 0.50 KSF
	P2	15		CONTINUES (CL-ML) PP = 1.50 KSF
5	P3	14		CONTINUES (CL-ML) PP = 1.50 KSF
				BOTTOM OF HOLE AT 6.5 FEET. BORING REMAINED OPEN. NO WATER ENCOUNTERED IN THIS BORING.
10				
15				
20				
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ANDERSON ENGINEERING CONSULTANTS, INC.
LITTLE ROCK ▲ JONESBORO

LOG OF BORING

PROJECT: AR STATE VETERANS CEMETARY ADDITION
BIRDEYE, ARKANSAS
BORING NO: B1

FOR: ECOLOGICAL DESIGN GROUP, INC.
LOCATION: SEE PLAN OF BORINGS

DATE: 01/14/22 **JOB NO:** 17011 **BORING TYPE:** AUGER W/SPT

DRILLER: J. SUTTON
SIMCO 2400
GEOTECHNICIAN: J. SUTTON **GROUND ELEVATION:** 228.5± msl

LEGEND

S Shelby Tube | NV Diamond Core | P Penetration Test
Core | Standard Penetration | J - Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	9		3.0 INCHES TOPSOIL SOFT TO STIFF MOIST BROWN SILTY CLAY (CL) PP = 1.00 KSF
	P2	12		CONTINUES (CL) PP = 1.25 KSF
5	P3	11		CONTINUES (CL) PP = 1.25 KSF
	P4	7		CONTINUES (CL) PP = 0.75 KSF
10	P5	4		CONTINUES (CL) PP = 0.50 KSF
15	P6	14		CONTINUES (CL) - BECOMES WET AND GRAY PP = 1.50 KSF
				BOTTOM OF HOLE AT 16.5 FEET. BORING REMAINED OPEN. WATER ENCOUNTERED AT 15.0 FEET DURING DRILLING.
20				
25				

FIELD CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

NON COHESIVE SOILS

(Silt, Sand, Gravel and Combinations)

Density

Very Loose	- 0 to 4 blows/ft.
Loose	- 4 to 10 blows/ft.
Medium Dense	- 10 to 30 blows/ft.
Dense	- 30 to 50 blows/ft.
Very Dense	- over 50

Relative Proportions

Descriptive Term	Percent
Trace	1 to 10
Little	11 to 20
Some	21 to 35
And	36 to 50

Particle Size Identification

Boulders	-	8-inch diameter or more	
Cobbles	-	3 to 8-inch diameter	
Gravel	-	Coarse	- 1 to 3-inch
		Medium	- ½ to 1-inch
		Fine	- ¼ to ½-inch
Sand	-	Coarse	- 0.6 mm to ¼-inch (dia. of pencil lead)
		Medium	- 0.2 mm to 0.6 mm (dia. of broom straw)
		Fine	- 0.05 mm to 0.2 mm (dia. of human hair)
Silt	-	0.06 mm to 0.002 mm (Cannot see particles)	

COHESIVE SOILS

(Clay, Silt and Combinations)

Consistency

Very Soft	- < 2 blows/ft.
Soft	- 2 to 4 blows/ft.
Medium Stiff	- 4 to 8 blows/ft.
Stiff	- 8 to 15 blows/ft.
Very Stiff	- 15 to 30 blows/ft.
Hard	- over 30

Plasticity

Degree of Plasticity	Plasticity Index
None to slight	0 to 4
Slight	5 to 7
Medium	8 to 22
High to Very High	over 22

NOTES

Classification - The classifications given on the logs are made by visual inspection.

Standard Penetration Test - Driving a 2.0-inch O.D., 1⅜-inch I.D., sampler a distance of 1.0 foot into undisturbed soil with a 140-pound hammer free falling a distance of 30.0 inches. It is customary for AECI to drive the spoon 6.0 inches to seat into undisturbed soil, then perform the test. The number of hammer blows for seating the spoon and making the tests are recorded for each 6.0 inches of penetration on the drill log (Example: 6/8/9). The standard penetration test results can be obtained by adding the last two figures (i.e., 8 + 9 = 17 blows/ft.).

Strata Changes - In the column "Soil Descriptions" on the drill log the horizontal lines represent strata changes. A solid line (——) represents an actually observed change, a dashed line (– – –) represents an estimated change.

Groundwater - The groundwater observations were made at the times indicated. Porosity of soil strata, weather conditions, site topography, etc., may cause changes in the water levels indicated on the logs.

KEY TO SOIL CLASSIFICATIONS AND SYMBOLS

UNIFIED SOIL CLASSIFICATION SYSTEM(1)

Major Divisions		Letter	Symbol: Hatching	Symbol: Color	Name
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW		RED	Well-graded gravels or gravel-sand mixtures, little or no fines
		GP		RED	Poorly-graded gravels or gravel-sand mixtures, little or no fines
		GM		YELLOW	Silty gravels, gravel-sand-silt mixtures
		GC		YELLOW	Clayey gravels, gravel-sand-clay mixtures
	SAND AND SANDY SOILS	SW		RED	Well-graded sands or gravelly sands, little or no fines
		SP		RED	Poorly-graded sands or gravelly sands, little or no fines
		SM		YELLOW	Silty sands, sand-silt mixtures
		SC		YELLOW	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS	SILTS AND CLAYS LL<50	ML		GREEN	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL		GREEN	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL		GREEN	Organic silts and organic silt-clays of low plasticity
	SILTS AND CLAYS LL>50	MH		BLUE	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH		BLUE	Inorganic clays of high plasticity, fat clays
		OH		BLUE	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS		Pt		ORANGE	Peat and other highly organic soils

TERMS CHARACTERIZING SOIL STRUCTURE(2)

SLICKENSIDED - having inclined planes of weakness that are slick and glossy in appearance.

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

LAMINATED (VARVED) - composed of thin layers of varying color and texture, usually grading from sand or silt at the bottom to clay at the top.

CRUMBLY - cohesive soils which break into small blocks or crumbs on drying.

CALCAREOUS - containing appreciable quantities of calcium carbonate, generally nodular.

WELL GRADED - having wide range in grain sizes and substantial amounts of all intermediate particle sizes.

POORLY GRADED - predominantly of one grain size (uniformly graded) or having a range of sizes with some intermediate size missing (gap or skip graded).

SYMBOLS FOR TEST DATA

M/C = 15 - Natural moisture content in percent.
γ = 95 - Dry unit weight in pounds/cubic foot.
Qu = 1.23 - Unconfined compression strength in tons/square foot.
Qc = 1.68 (21 psi) - Confined compression strength at indicated lateral pressure.
51-21-30 - Liquid limit, Plastic limit, and Plasticity index.
30% FINER - Percent finer than No. 200 mesh sieve.
30 B/F - Blows per foot, Standard Penetration test.
▼ - Hydrostatic water table.
▽ - Static water table.

TERMS DESCRIBING CONSISTENCY OF SOILS(2)

COARSE GRAINED SOILS		FINE GRAINED SOILS		
DESCRIPTIVE TERM	NO. BLOWS/FOOT STANDARD PEN. TEST	DESCRIPTIVE TERM	NO. BLOWS/FOOT STANDARD PEN. TEST	UNCONFINED COMPRESSION TONS PER SQ. FT.
Very Loose	0 - 4	Very Soft	<2	<0.25
Loose	4 - 10	Soft	2 - 4	0.25 - 0.50
Firm (medium dense)	10 - 30	Plastic (medium stiff)	4 - 8	0.50 - 1.00
Dense	30 - 50	Stiff	8 - 15	1.00 - 2.00
Very Dense	over 50	Very Stiff	15 - 30	2.00 - 4.00
		Hard	over 30	over 4.00

Field classification for "Consistency" is determined with a 0.25-inch diameter penetrometer.

(1) - From Waterways Experiment Station Technical Memorandum No. 3-357
(2) - From "Soil Mechanics in Engineering Practice" by Terzaghi and Peck

UNIFIED SOIL CLASSIFICATION SYSTEM
(ASTM D 2487)

Major divisions			Group Symbols	Typical Names	Laboratory Classifications Criteria
Coarse-grained soils (More than half of material is larger than No. 200 sieve size)	Gravels (more than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than 5 percent ..... GW, GP, SW, SP; More than 12 percent ..... GM, GC, SM, SC; 5 to 12 percent ..... Borderline cases requiring dual symbols **
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	
		Gravels with fines (Appreciable amount of fines)	GM* d / u	Silty gravels, gravel-sand-silt mixtures	
			GC	Clayey gravels, gravel-sand-clay mixtures	
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines	
			SP	Poorly graded sands, gravelly sands, little or no fines	
		Sands with fines (Appreciable amount of fines)	SM* d / u	Silty sands, sand-silt mixtures	
			SC	Clayey sands, sand-clay mixtures	
Fine-grained soils (More than half of material is smaller than No. 200 sieve)	Silts and clays (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity	
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL	Organic silts and organic silty clays of low plasticity	
	Silts and clays (Liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	
			CH	Inorganic clays of high plasticity, fat clays	
			OH	Organic clays of medium to high plasticity, organic silts	
	Highly Organic soils		Pt	Peat and other highly organic soils	

$C_u = \frac{D_{60}}{D_{10}}$ greater than 4 — $C_c = \frac{(D_{30})^2}{D_{10} X D_{60}}$ between 1 & 3

Not meeting all gradation requirements for GW

Atterberg limits below "A" line or P.I. less than 4 — Above "A" line with P.I. Between 4 and 7 are borderline cases requiring use of dual symbols

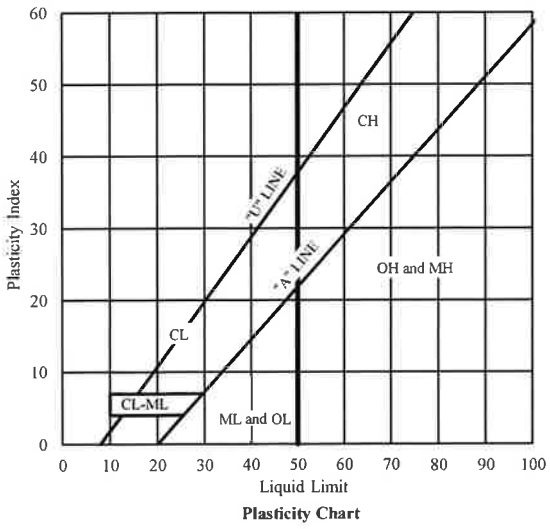
Atterberg limits above "A" line with P.I. greater than 7

$C_u = \frac{D_{60}}{D_{10}}$ greater than 4 — $C_c = \frac{(D_{30})^2}{D_{10} X D_{60}}$ between 1 & 3

Not meeting all gradation requirements for SW

Atterberg limits below "A" line or P.I. less than 4 — Limits plotting in hatched zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols

Atterberg limits above "A" line with P.I. greater than 7

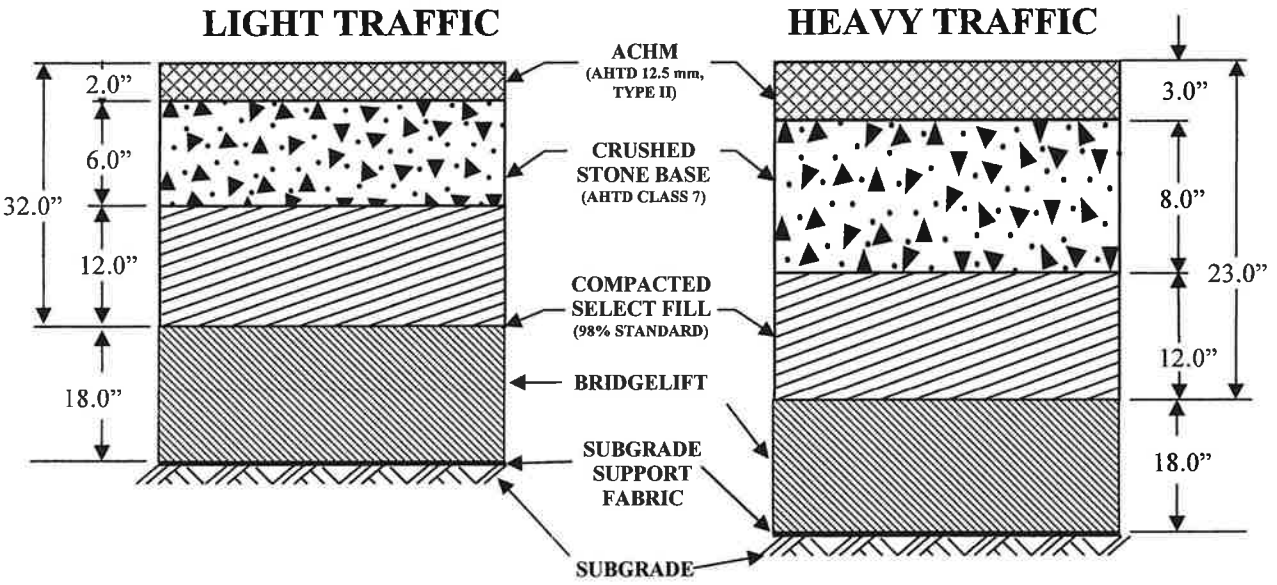


Plasticity Chart

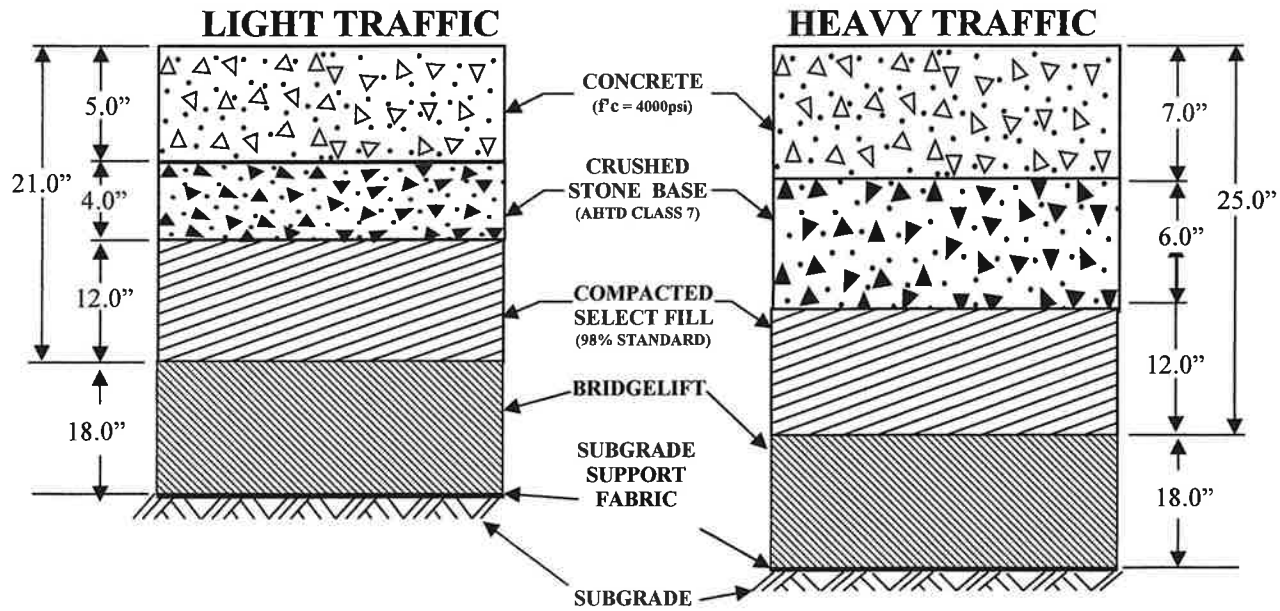
*Division of GM and SM groups into subdivisions of d and u are for roads and airfield only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. Is 6 or less; u used when L.L. is greater than 24.

**Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example GW-GC, well-graded gravel-sand mixture with clay binder.

RECOMMENDED FLEXIBLE PAVEMENT STRUCTURE



RECOMMENDED RIGID PAVEMENT STRUCTURE



APPENDIX B

SUPPORTING LABORATORY DATA

MOISTURE CONTENT DETERMINATION
ASTM D 2216

Project: ARKANSAS STATE VETERANS CEMETERY ADDITIONS **Project No.:** 17011

Location: BIRDEYE, ARKANSAS **Date:** 01/21/22

MOISTURE CONTENT

Sample Number	C7;P1	C7;P2	C7;P3	C7;P4	C7;P5
Tare Number	AW	A	HM	CJ	B44
Tare + Wet Soil (g)	180.30	183.47	181.00	195.29	155.24
Tare + Dry Soil (g)	158.79	156.81	155.46	162.83	133.86
Tare (g)	10.93	11.83	11.48	11.70	10.37
Water (g)	21.51	26.66	25.54	32.46	21.38
Dry Soil (g)	147.86	144.98	143.98	151.13	123.49
Water Content (%)	**14.55**	**18.39**	**17.74**	**21.48**	**17.31**

ATTERBERG LIMIT DETERMINATION
ASTM D 4318

Project: ARKANSAS STATE VETERANS CEMETERY ADDITIONS **Project No.:** 17011
Location: BIRDEYE, ARKANSAS **Date:** 01/25/22

LIQUID LIMIT

Sample Number	C1;P1	C1;P3	C3;P2	C3;P4	C5;P5	C7;P2	C7;P5
Tare Number	X04	74	LTB	155	25	18	
Number of Blows	21	20	21	22	29	25	
Tare + Wet Soil (g)	17.05	32.82	27.32	17.09	26.96	33.87	
Tare + Dry Soil (g)	15.05	27.84	22.37	15.06	23.71	29.01	
Tare (g)	8.10	8.00	6.86	8.16	8.21	8.15	
Water (g)	2.00	4.98	4.95	2.03	3.25	4.86	
Dry Soil (g)	6.95	19.84	15.51	6.90	15.50	20.86	
Water Content (%)	28.78	25.10	31.91	29.42	20.97	23.30	
Liquid Limit	28	24	31	29	21	23	NP

NON - PLASTIC

PLASTIC LIMIT

Sample Number	C1;P1	C1;P3	C3;P2	C3;P4	C5;P5	C7;P2	C7;P5
Tare Number	11A	008	JAF	KC	FAJ	XA	
Tare + Wet Soil (g)	17.61	18.10	20.94	17.99	23.12	19.78	
Tare + Dry Soil (g)	16.25	16.51	18.81	16.47	21.23	18.04	
Tare (g)	8.11	8.08	8.13	7.94	8.17	8.00	
Water (g)	1.36	1.59	2.13	1.52	1.89	1.74	
Dry Soil (g)	8.14	8.43	10.68	8.53	13.06	10.04	
Water Content (%)	16.71	18.86	19.94	17.82	14.47	17.33	
Plastic Limit	17	19	20	18	14	17	
Plasticity Index	**11**	**5**	**11**	**11**	**7**	**6**	
Classification (#40)	CL	CL-ML	CL	CL	CL	CL-ML	NP

NON - PLASTIC

LIQUID LIMIT

Sample Number	SR2;P2	SR4;P1	SR4;P3	SR6;P1	SR6;P3	SR7;P2	P1;P2
Tare Number	41	KH	19	67	KPA		75
Number of Blows	28	24	21	25	21		22
Tare + Wet Soil (g)	34.28	28.56	32.11	26.58	32.14		32.43
Tare + Dry Soil (g)	29.75	23.89	26.79	22.70	27.71		28.23
Tare (g)	8.10	6.85	8.08	7.57	7.82		8.01
Water (g)	4.53	4.67	5.32	3.88	4.43		4.20
Dry Soil (g)	21.65	17.04	18.71	15.13	19.89		20.22
Water Content (%)	20.92	27.41	28.43	25.64	22.27		20.77
Liquid Limit	21	27	28	26	22	NP	20

NON - PLASTIC

PLASTIC LIMIT

Sample Number	SR2;P2	SR4;P1	SR4;P3	SR6;P1	SR6;P3	SR7;P2	P1;P2
Tare Number	33	42X	38	T58	97		LP
Tare + Wet Soil (g)	22.88	15.77	18.81	16.78	16.20		21.27
Tare + Dry Soil (g)	20.69	14.27	17.32	15.17	15.05		19.45
Tare (g)	8.41	6.82	8.09	6.75	8.23		8.04
Water (g)	2.19	1.50	1.49	1.61	1.15		1.82
Dry Soil (g)	12.28	7.45	9.23	8.42	6.82		11.41
Water Content (%)	17.83	20.13	16.14	19.12	16.86		15.95
Plastic Limit	18	20	16	19	17		16
Plasticity Index	**3**	**7**	**12**	**7**	**5**		**4**
Classification (#40)	ML	CL	CL	CL-ML	CL-ML	NP	CL-ML

NON - PLASTIC

ATTERBERG LIMIT DETERMINATION
ASTM D 4318

Project: ARKANSAS STATE VETERANS CEMETERY ADDITIONS **Project No.:** 17011
Location: BIRDEYE, ARKANSAS **Date:** 01/25/22

LIQUID LIMIT

Sample Number	P2;P1	P2;P3	P3;P2	P4;P1	P5;P2	P6;P1	P6;P3
Tare Number	NON - PLASTIC	007	NON - PLASTIC	NON - PLASTIC	NON - PLASTIC	KNL	27
Number of Blows		23				26	28
Tare + Wet Soil (g)		16.73				33.77	27.25
Tare + Dry Soil (g)		14.60				29.17	23.42
Tare (g)		6.77				8.75	8.09
Water (g)		2.13				4.60	3.83
Dry Soil (g)		7.83				20.42	15.33
Water Content (%)		27.20				22.53	24.98
Liquid Limit	NP	27	NP	NP	NP	23	25

PLASTIC LIMIT

Sample Number	P2;P1	P2;P3	P3;P2	P4;P1	P5;P2	P6;P1	P6;P3
Tare Number	NON - PLASTIC	72	NON - PLASTIC	NON - PLASTIC	NON - PLASTIC	868	55
Tare + Wet Soil (g)		18.55				18.03	24.45
Tare + Dry Soil (g)		17.00				16.40	21.81
Tare (g)		7.76				6.76	7.55
Water (g)		1.55				1.63	2.64
Dry Soil (g)		9.24				9.64	14.26
Water Content (%)		16.77				16.91	18.51
Plastic Limit		17				17	19
Plasticity Index		**10**				**6**	**6**
Classification (#40)	NP	CL	NP	NP	NP	CL-ML	CL-ML

LIQUID LIMIT

Sample Number	B1;P2
Tare Number	16A
Number of Blows	20
Tare + Wet Soil (g)	19.63
Tare + Dry Soil (g)	16.71
Tare (g)	8.21
Water (g)	2.92
Dry Soil (g)	8.50
Water Content (%)	34.35
Liquid Limit	33

PLASTIC LIMIT

Sample Number	B1;P2
Tare Number	48
Tare + Wet Soil (g)	18.38
Tare + Dry Soil (g)	16.72
Tare (g)	8.00
Water (g)	1.66
Dry Soil (g)	8.72
Water Content (%)	19.04
Plastic Limit	19
Plasticity Index	**14**
Classification (#40)	CL

MECHANICAL GRAIN SIZE ANALYSES
ASTM D 422 & D 1140

Project: ARKANSAS STATE VETERANS CEMETERY ADDITIONS
Project No.: 17011
Location: BIRDEYE, ARKANSAS
Date: 01/26/22
Sample No.: C1;P3
Sample Depth: 5'-6.5'
Soil Description: REDDISH BROWN SILTY CLAY W/ SAND

Sieve or Screen	Weight Retained (grams)	Cumulative Weight Retained (grams)	Percent Retained	Percent Passing
3"	0.0	0.0	0.0	100.0
3/4"	0.0	0.0	0.0	100.0
#4	0.0	0.0	0.0	100.0
#10	0.2	0.2	0.0	100.0
#40	4.5	4.7	0.9	99.1
#200	143.9	148.6	28.7	71.3
PAN	369.2	517.8	100.0	0.0

Percent Sample Gravel: 0.0
Percent Sample Sand: 28.7
Percent Sample Silt/Clay: 71.3
Sample Weight: 517.8g
Washing Loss: 369.2g

Project: ARKANSAS STATE VETERANS CEMETERY ADDITIONS
Project No.: 17011
Location: BIRDEYE, ARKANSAS
Date: 01/26/22
Sample No.: C3;P2
Sample Depth: 2.5'-4'
Soil Description: REDDISH BROWN & LIGHT GRAYISH BROWN LEAN CLAY

Sieve or Screen	Weight Retained (grams)	Cumulative Weight Retained (grams)	Percent Retained	Percent Passing
3"	0.0	0.0	0.0	100.0
3/4"	0.0	0.0	0.0	100.0
#4	0.2	0.2	0.0	100.0
#10	0.2	0.4	0.1	99.9
#40	3.2	3.6	0.7	99.3
#200	58.3	61.9	11.6	88.4
PAN	469.8	531.7	100.0	0.0

Percent Sample Gravel: 0.0
Percent Sample Sand: 11.6
Percent Sample Silt/Clay: 88.4
Sample Weight: 531.7g
Washing Loss: 469.8g

MECHANICAL GRAIN SIZE ANALYSES
ASTM D 422 & D 1140

Project: ARKANSAS STATE VETERANS CEMETERY ADDITIONS
Project No.: 17011
Location: BIRDEYE, ARKANSAS
Date: 01/26/22
Sample No.: C5;P5
Sample Depth: 10'-11.5'
Soil Description: REDDISH BROWN CLAYEY SAND W/ GRAVEL

Sieve or Screen	Weight Retained (grams)	Cumulative Weight Retained (grams)	Percent Retained	Percent Passing
3"	0.0	0.0	0.0	100.0
3/4"	18.4	18.4	4.1	95.9
#4	83.1	101.5	22.4	77.6
#10	30.1	131.6	29.0	71.0
#40	34.9	166.5	36.7	63.3
#200	164.0	330.5	72.8	27.2
PAN	123.2	453.7	100.0	0.0

Percent Sample Gravel: 22.4
Percent Sample Sand: 50.5
Percent Sample Silt/Clay: 27.2
Sample Weight: 453.7g
Washing Loss: 123.2g

Project: ARKANSAS STATE VETERANS CEMETERY ADDITIONS
Project No.: 17011
Location: BIRDEYE, ARKANSAS
Date: 01/26/22
Sample No.: C7;P2
Sample Depth: 2.5'-4'
Soil Description: LIGHT REDDISH BROWN & LIGHT GRAY SILTY CLAYEY SAND

Sieve or Screen	Weight Retained (grams)	Cumulative Weight Retained (grams)	Percent Retained	Percent Passing
3"	0.0	0.0	0.0	100.0
3/4"	0.0	0.0	0.0	100.0
#4	41.0	41.0	7.7	92.3
#10	25.6	66.6	12.5	87.5
#40	66.2	132.8	25.0	75.0
#200	208.5	341.3	64.2	35.8
PAN	190.3	531.6	100.0	0.0

Percent Sample Gravel: 7.7
Percent Sample Sand: 56.5
Percent Sample Silt/Clay: 35.8
Sample Weight: 531.6g
Washing Loss: 190.3g

MECHANICAL GRAIN SIZE ANALYSES
ASTM D 422 & D 1140

Project: ARKANSAS STATE VETERANS CEMETERY ADDITIONS
Project No.: 17011
Location: BIRDEYE, ARKANSAS
Date: 01/26/22
Sample No.: C7;P5
Sample Depth: 10'-11.5'
Soil Description: LIGHT GRAY & LIGHT REDDISH BROWN SANDY SILT

Sieve or Screen	Weight Retained (grams)	Cumulative Weight Retained (grams)	Percent Retained	Percent Passing
3"	0.0	0.0	0.0	100.0
3/4"	0.0	0.0	0.0	100.0
#4	2.3	2.3	0.7	99.3
#10	2.0	4.3	1.3	98.7
#40	9.9	14.2	4.4	95.6
#200	132.5	146.7	45.0	55.0
PAN	179.2	325.9	100.0	0.0

Percent Sample Gravel: 0.7
Percent Sample Sand: 44.3
Percent Sample Silt/Clay: 55.0
Sample Weight: 325.9g
Washing Loss: 179.2g

Project: ARKANSAS STATE VETERANS CEMETERY ADDITIONS
Project No.: 17011
Location: BIRDEYE, ARKANSAS
Date: 01/26/22
Sample No.: SR2;P2
Sample Depth: 2.5'-4'
Soil Description: LIGHT GRAY & LIGHT REDDISH BROWN SILTY SAND

Sieve or Screen	Weight Retained (grams)	Cumulative Weight Retained (grams)	Percent Retained	Percent Passing
3"	0.0	0.0	0.0	100.0
3/4"	0.0	0.0	0.0	100.0
#4	10.1	10.1	1.9	98.1
#10	10.8	20.9	3.9	96.1
#40	56.1	77.0	14.5	85.5
#200	201.6	278.6	52.6	47.4
PAN	251.4	530.0	100.0	0.0

Percent Sample Gravel: 1.9
Percent Sample Sand: 50.7
Percent Sample Silt/Clay: 47.4
Sample Weight: 530.0g
Washing Loss: 251.4g

MECHANICAL GRAIN SIZE ANALYSES
ASTM D 422 & D 1140

Project: ARKANSAS STATE VETERANS CEMETERY ADDITIONS
Project No.: 17011
Location: BIRDEYE, ARKANSAS
Date: 01/26/22
Sample No.: SR4;P3
Sample Depth: 5'-6.5'
Soil Description: REDDISH BROWN CLAYEY SAND W/ GRAVEL

Sieve or Screen	Weight Retained (grams)	Cumulative Weight Retained (grams)	Percent Retained	Percent Passing
3"	0.0	0.0	0.0	100.0
3/4"	30.9	30.9	5.8	94.2
#4	50.2	81.1	15.3	84.7
#10	22.7	103.8	19.6	80.4
#40	72.1	175.9	33.1	66.9
#200	142.4	318.3	60.0	40.0
PAN	212.5	530.8	100.0	0.0

Percent Sample Gravel: 15.3
Percent Sample Sand: 44.7
Percent Sample Silt/Clay: 40.0
Sample Weight: 530.8g
Washing Loss: 212.5g

Project: ARKANSAS STATE VETERANS CEMETERY ADDITIONS
Project No.: 17011
Location: BIRDEYE, ARKANSAS
Date: 01/26/22
Sample No.: SR6;P1
Sample Depth: 0'-1.5'
Soil Description: GRAYISH BROWN & REDDISH BROWN SANDY SILTY CLAY

Sieve or Screen	Weight Retained (grams)	Cumulative Weight Retained (grams)	Percent Retained	Percent Passing
3"	0.0	0.0	0.0	100.0
3/4"	0.0	0.0	0.0	100.0
#4	0.6	0.6	0.1	99.9
#10	2.3	2.9	0.6	99.4
#40	24.5	27.4	5.7	94.3
#200	129.9	157.3	32.8	67.2
PAN	321.9	479.2	100.0	0.0

Percent Sample Gravel: 0.1
Percent Sample Sand: 32.7
Percent Sample Silt/Clay: 67.2
Sample Weight: 479.2g
Washing Loss: 321.9g

MECHANICAL GRAIN SIZE ANALYSES
ASTM D 422 & D 1140

Project: ARKANSAS STATE VETERANS CEMETERY ADDITIONS
Project No.: 17011
Location: BIRDEYE, ARKANSAS
Date: 01/26/22
Sample No.: SR6;P3
Sample Depth: 5'-6.5'
Soil Description: REDDISH BROWN & GRAYISH BROWN SILTY CLAYEY SAND

Sieve or Screen	Weight Retained (grams)	Cumulative Weight Retained (grams)	Percent Retained	Percent Passing
3"	0.0	0.0	0.0	100.0
3/4"	12.3	12.3	3.5	96.5
#4	23.3	35.6	10.2	89.8
#10	8.3	43.9	12.6	87.4
#40	33.8	77.7	22.3	77.7
#200	143.2	220.9	63.4	36.6
PAN	127.3	348.2	100.0	0.0

Percent Sample Gravel: 10.2
Percent Sample Sand: 53.2
Percent Sample Silt/Clay: 36.6
Sample Weight: 348.2g
Washing Loss: 127.3g

Project: ARKANSAS STATE VETERANS CEMETERY ADDITIONS
Project No.: 17011
Location: BIRDEYE, ARKANSAS
Date: 01/26/22
Sample No.: SR9;P3
Sample Depth: 5'-6.5'
Soil Description: REDDISH BROWN POORLY GRADED SAND W/ SILT & GRAVEL

Sieve or Screen	Weight Retained (grams)	Cumulative Weight Retained (grams)	Percent Retained	Percent Passing
3"	0.0	0.0	0.0	100.0
3/4"	18.2	18.2	4.1	95.9
#4	149.1	167.3	37.5	62.5
#10	55.2	222.5	49.9	50.1
#40	84.3	306.8	68.8	31.2
#200	103.0	409.8	91.8	8.2
PAN	36.4	446.2	100.0	0.0

Percent Sample Gravel: 37.5
Percent Sample Sand: 54.3
Percent Sample Silt/Clay: 8.2
Sample Weight: 446.2g
Washing Loss: 36.4g

MECHANICAL GRAIN SIZE ANALYSES
ASTM D 422 & D 1140

Project: ARKANSAS STATE VETERANS CEMETERY ADDITIONS
Project No.: 17011
Location: BIRDEYE, ARKANSAS
Date: 01/26/22
Sample No.: P2;P1
Sample Depth: 0'-1.5'
Soil Description: GRAY & BROWNISH GRAY SILTY SAND

Sieve or Screen	Weight Retained (grams)	Cumulative Weight Retained (grams)	Percent Retained	Percent Passing
3"	0.0	0.0	0.0	100.0
3/4"	0.0	0.0	0.0	100.0
#4	8.1	8.1	4.1	95.9
#10	11.3	19.4	9.9	90.1
#40	41.5	60.9	31.1	68.9
#200	55.4	116.3	59.5	40.5
PAN	79.3	195.6	100.0	0.0

Percent Sample Gravel: 4.1
Percent Sample Sand: 55.3
Percent Sample Silt/Clay: 40.5
Sample Weight: 195.6g
Washing Loss: 79.3g

Project: ARKANSAS STATE VETERANS CEMETERY ADDITIONS
Project No.: 17011
Location: BIRDEYE, ARKANSAS
Date: 01/26/22
Sample No.: P3;P2
Sample Depth: 2.5'-4'
Soil Description: LIGHT REDDISH BROWN & GRAYISH BROWN SILTY SAND

Sieve or Screen	Weight Retained (grams)	Cumulative Weight Retained (grams)	Percent Retained	Percent Passing
3"	0.0	0.0	0.0	100.0
3/4"	0.0	0.0	0.0	100.0
#4	0.0	0.0	0.0	100.0
#10	2.6	2.6	0.5	99.5
#40	18.0	20.6	3.7	96.3
#200	324.7	345.3	61.6	38.4
PAN	215.0	560.3	100.0	0.0

Percent Sample Gravel: 0.0
Percent Sample Sand: 61.6
Percent Sample Silt/Clay: 38.4
Sample Weight: 560.3g
Washing Loss: 215.0g

MECHANICAL GRAIN SIZE ANALYSES
ASTM D 422 & D 1140

Project: ARKANSAS STATE VETERANS CEMETERY ADDITIONS
Project No.: 17011
Location: BIRDEYE, ARKANSAS
Date: 01/26/22
Sample No.: P6;P1
Sample Depth: 0'-1.5'
Soil Description: BROWNISH GRAY & LIGHT REDDISH BROWN SANDY SILTY CLAY

Sieve or Screen	Weight Retained (grams)	Cumulative Weight Retained (grams)	Percent Retained	Percent Passing
3"	0.0	0.0	0.0	100.0
3/4"	0.0	0.0	0.0	100.0
#4	14.2	14.2	2.7	97.3
#10	12.4	26.6	5.1	94.9
#40	38.7	65.3	12.5	87.5
#200	189.0	254.3	48.5	51.5
PAN	269.6	523.9	100.0	0.0

Percent Sample Gravel: 2.7
Percent Sample Sand: 45.8
Percent Sample Silt/Clay: 51.5
Sample Weight: 523.9g
Washing Loss: 269.6g

Project: ARKANSAS STATE VETERANS CEMETERY ADDITIONS
Project No.: 17011
Location: BIRDEYE, ARKANSAS
Date: 01/26/22
Sample No.: P6;P3
Sample Depth: 5'-6.5'
Soil Description: LIGHT GRAY & REDDISH BROWN SILTY CLAY W/ SAND

Sieve or Screen	Weight Retained (grams)	Cumulative Weight Retained (grams)	Percent Retained	Percent Passing
3"	0.0	0.0	0.0	100.0
3/4"	0.0	0.0	0.0	100.0
#4	0.0	0.0	0.0	100.0
#10	1.8	1.8	0.3	99.7
#40	8.4	10.2	1.9	98.1
#200	111.1	121.3	22.1	77.9
PAN	428.1	549.4	100.0	0.0

Percent Sample Gravel: 0.0
Percent Sample Sand: 22.1
Percent Sample Silt/Clay: 77.9
Sample Weight: 549.4g
Washing Loss: 428.1g

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SECTION 01 00 00

GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 **Contractor** to provide their Dun's/CCR number for verification.

1.2 Contractor shall provide a Construction Manager for this project; construction project manager responsibilities shall include:

A. Project scheduling

B. Project cost tracking

C. Review work on daily basis

D. Payment application preparation

E. RFI preparation and documentation

F. Analyze, manage and mitigate risk

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 09 00

ENGINEERING INSPECTIONS AND OBSERVATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Engage and provide a qualified Engineering Inspections and Observations firm to provide Owner and Engineer of Record daily Inspections and Observations and reports in addition to other inspections and observations required in other Specification Sections for the project. Frequency of Inspections and Observations shall be on an as-needed basis.

1. At a minimum the Inspections and Observations Engineer shall witness materials sampling and testing, City Inspections requiring an Owner Representative, and monthly Progress meetings.

2. Engineer of record may be retained at their standard hourly billing rate.

3. A third-party Engineer licensed in the State of Arkansas may be retained to provide the required daily Inspections and Observations.

B. Inspections and Observations Engineer shall report directly to the project Engineer of Record and the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 10 00

STANDARD SPECIFICATION REFERENCE

PART 1 - GENERAL

1.1 SUMMARY

A. All materials and construction shall comply with the latest edition of the following standard Specifications and Codes. The following specifications and codes are hereby incorporated by reference to these Project Specifications.

1. Vandale Birdeye Water Association standards and specifications, available at the following website; https://vanndalebirdeyewater.nexbillpayonline.com/

2. Central Arkansas Water Standard Pipeline Materials and Construction Specifications 2016; available for download at the following website; http://www.carkw.com/engineering/planning/01_final_standard_specs_dwgs_sept_2016-3/

B. If conflicts exist between the referenced Standard Specifications and other specifications incorporated in these contract documents, the more stringent requirement shall govern.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 10 01

ENDANGERED SPECIES ACT COMPLIANCE

PART 1 - GENERAL

1.1 SUMMARY

A. Contractor shall comply with all requirements and recommendations of the United States Endangered Species Act and Gold and Bald Eagle Protection Act. All construction activity shall comply with the recommendations and requirements of the US Fish and Wildlife Service for the protection of endangered species. The following documents and codes are hereby incorporated by reference to these Project Specifications.
   1. Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 et seq.)
   2. Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d)

B. There are NOT know endangered species or Bald or Golden Eagles present at or near the proposed work areas.

C. If endangered species or Bald or Golden Eagles are encountered during construction the Contractor shall stop work immediately and notify the Owner and Engineer. Contractor shall await direction prior to commencing work activities.

D. Contractor shall conduct a tree removal pre-construction conference to review the trees to be removed.

E. Contractor shall obtain written approval from the City, Owner and Engineer prior to any burning of trees or brush onsite.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 10 02

STORMWATER POLLUTION PREVENTION PLAN

PART 1 - GENERAL

1.1 SUMMARY

A. Contractor shall comply with all requirements and recommendations of the Arkansas Department of Environmental Quality (ADEQ) Construction Stormwater Discharge Permit. The following documents and codes are hereby incorporated by reference to these Project Specifications.
   1. Stormwater Pollution Prevention Plan (SWPPP) for Construction Activities for Small Construction Sites.
   2. ADEQ SWPPP General Permit No. ARR150000
   3. Contractor shall be responsible for all fees associated with the SWPPP.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

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Stormwater Pollution Prevention Plan (SWPPP) for Construction Activity for Small Construction Sites

National Pollutant Discharge Elimination System (NPDES)
General Permit # ARR150000

Prepared for:

State of Arkansas, Department of Veterans Affairs
501 Woodland Drive, Suite 401N
Little Rock, Arkansas 72201

Date:

2/22/2023

Prepared by:

Ecological Design Group, Inc.
216 W Birch St
Rogers, AR 72756

Revised date: 10/20/2016

Project Name and Location: **Arkansas State Veterans Cemetery – Birdeye Phase 2, 3600 HWY 163, Birdeye, Arkansas**

Property Parcel Number (*Optional*):

Operator Name and Address: **State of Arkansas – Department of Veterans Affair, 501 Woodlane Drive, Suite 401N, Little Rock, Arkansas 72201**

A. Site Description
   a. Project description, intended use after NOI is filed: **The development will consist of various improvements to the existing cemetery including but not limited to: sidewalk repair/replacement, drainage structure repair/replacement, utility improvements such as fiber optic services and electrical services, administrative and maintenance building enhancements, new irrigation and landscaping throughout the site, earthwork and associated activities involved in creating a new burial section, and new concrete pavement in limited areas.**
   b. Sequence of major activities which disturbsoils: **Prior to any surface disturbance the site perimeter BMP's including silt fence or wattles, and the major inlet protection for existing storm inlets and rock check dams for existing concentrated flow areas shall be constructed. This will include concrete washouts. After these initial temporary BMP's are in place, demolition activities will be allowed to occur within the limits of construction. During the demolition activities and throughout the entire length of the project, additional erosion control BMP's shall be constructed as needed including but not limited to the use of watering trucks for dust control. The following will commence at the discretion of the contractor's construction schedule but will include: Earthwork and initial grading to prepare the site for construction access drives. Heavier mass grading activities will commence in the new burial section. Any dewatering of excavations shall be discharged into a filter to remove sediments prior to ultimate discharge to the creek. After major areas of mass grading are completed, additional BMP's will be constructed at the toe of slopes and at new areas of concentrated flows. Areas that will not be disturbed for 14 days or longer will receive temporary stabilization with mulch, hydro-mulch or other Engineer approved measure. Private utilities and storm infrastructure will be installed. New and existing storm inlets shall be protected with BMP's. Lastly, final grading, then landscaping and final stabilization. Work will progress according to the Contractor's schedule. Upon completion of work and final stabilization of all disturbed areas temporary BMP's will be removed.**
   c. Total Area: 99.14 Acres Disturbed Area: 4.35 Acres

B. Responsible Parties
   Be sure to assign all SWPPP related activities to an individual or position; even if the specific individual is not yet known (i.e. contractor has not been chosen).

Individual/Company	Phone Number	Service Provided for SWPPP (i.e., Inspector, SWPPP revisions, Stabilization Activities, BMP Maintenance, etc.)
TBD	TBD	Contractor, Inspector, SWPPP revisions, Stabilization Activities, BMP Maintenance
Arkansas Department of Veterans Affairs	TBD	Owner/Operator
Ecological Design Group, Inc.	501-516-1133	Consultant / Initial SWPPP

C. Receiving Waters
   a. The following waterbody (or waterbodies) receives stormwater from this construction site:_____
   b. Is the project located within the jurisdiction of an MS4? [X] **Yes** [ ] No
      i. If yes, Name of MS4:_____
   c. Ultimate Receiving Water:

[ ] Red River	[ ] White River
[ ] Ouachita River	[X] **St. Francis River**
[ ] Arkansas River	[ ] Mississippi River

D. Site Map Requirements (Attach Site Map):
   a. Pre-construction topographic view;

b. Direction of stormwater flow (i.e., use arrows to show which direction stormwater will flow) and approximate slopes anticipated after grading activities;
c. Delineate on the site map areas of soil disturbance and areas that will not be disturbed under the coverage of this permit;
d. Location of major structural and nonstructural controls identified in the plan;
e. Location of main construction entrance and exit;
f. Location where stabilization practices are expected to occur;
g. Locations of off-site materials, waste, borrow area, or equipment storage area;
h. Location of areas used for concrete wash-out;
i. Location of all surface water bodies (including wetlands) with associated natural buffer boundary lines. Identify floodplain and floodway boundaries, if available;
j. Locations where stormwater is discharged to a surface water and/or municipal separate storm sewer system if applicable,
k. Locations where stormwater is discharged off-site (should be continuously updated);
l. Areas where final stabilization has been accomplished and no further construction phase permit requirements apply;
m. A legend that identifies any erosion and sediment control measure symbols/labels used in the site map and/or detail sheet; and
n. Locations of any storm drain inlets on the site and in the immediate vicinity of the site.

E. Stormwater Controls

a. Initial Site Stabilization, Erosion and Sediment Controls, and Best Management Practices:

i. Initial Site Stabilization: **The limits of clearing will be clearly marked. A minimum amount of vegetation will be removed to clear the limit of work. Inlet protection, silt fence, wattle, rock check dams, etc. will be installed as shown on the erosion control plan. Tree protection fencing will be installed around trees to be preserved within the disturbed area.**

ii. Erosion and Sediment Controls: **Vegetative stabilization including seeding and mulching disturbed areas, silt fences for areas that sheet flow, rock check dams where flows are concentrated, wattles for protection along fill slopes, and inlet protection for new and existing structures.**

iii. If periodic inspections or other information indicates a control has been used inappropriately or incorrectly, the operator will replace or modify the control for site situations: ☐ **Yes** ☐ No

If No, explain:_____

_____

iv. Off-site accumulations of sediment will be removed at a frequency sufficient to minimize off-site impacts: [X] **Yes** [ ] No

If No, explain: _____

v. Sediment will be removed from sediment traps or sedimentation ponds when design capacity has been reduced by 50%: [X] **Yes** [ ] No

If No, explain: _____

vi. Litter, construction debris, and construction chemicals exposed to stormwater shall be prevented from becoming a pollutant source for stormwater discharges: [X] **Yes** [ ] No

If No, explain: _____

vii. Off-site material storage areas used solely by the permitted project are being covered by this SWPPP: [ ] Yes [X] **No**

If Yes, explain additional BMPs implemented at off-site material storage area: _____

b. Stabilization Practices

i. Description and Schedule: : **All disturbed areas that have not received permanent vegetation stabilization within 14 days shall be temporarily vegetated and mulched. Temporary stabilization may include mulch, matting, and temporary seeding. Permanent stabilization will include compost and seed and will provide min. 80% coverage of pre-construction vegetative cover. Construction will be sequenced to minimize disturbed areas being exposed to erosive forces. Compost, seed, and erosion control matting at all disturbed areas.**

ii. Are buffer areas required? [X] **Yes** [ ] No

If Yes, are buffer areas being used? [X] **Yes** [ ] No

If No, explain why not: _____

If Yes, describe natural buffer areas: **Existing vegetated riparian zones and vegetated areas around any drainage swale will be protected to the maximum extent practicable; only encroached upon if an element of construction requires, and then done with care to minimize disturbance. If disturbance is unavoidable, buffer will be stabilized immediately following disturbance activity.**

iii. A record of the dates when grading activities occur, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization measures are initiated shall be included with the plan.

[X] **Yes** [ ] No

If No, explain: _____

iv. Deadlines for stabilization:

1. Stabilization procedures will be initiated 14 days after construction activity temporarily ceases on a portion of the site.
2. Stabilization procedures will be initiated immediately in portions of the site where construction activities have permanently ceased.

c. Structural Practices

i. Describe any structural practices to divert flows from exposed soils, store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site: **Wattles installed perpendicular to fill slopes. Silt fences will be installed at the downhill slope from all disturbed areas that border the stream. Inlet protection will be used around all existing and new inlet structures. Rock check dams will be used at the base of discharge pipes to slow the water and decrease erosion potential. Rock check dams will also be used in areas where flow is concentrated during construction. Concrete washout areas will be provided which will serve as truck wash areas.**

ii. Describe Velocity Dissipation Devices**: Rock check dams at the end of discharge pipes and at regular intervals where water is concentrated, and silt fence will be used to slow the velocity if concentrated flow areas**

iii. Sediment Basins:

Are 10 or more acres draining to a common point? ☐ Yes ☒ **No**

Is a sediment basin included in the project? ☐ Yes ☒ **No**

If Yes, what is the designed capacity for the storage?

☐ 3600 cubic feet per acre = : _____

or

☐ 10 year, 24 hour storm = : _____

☐ Other criteria were used to design basin: _____

_____

If No, explain why no sedimentation basin was included and describe required natural buffer areas and other controls implemented instead: **The project consists of dispersed work activity with BMP's that limit or will contain erosion. The rock check dams around the side will service as sediment basins and some work that is adjacent to the existing reservoir will consider the reservoir as a sediment basin. All areas protected by silt fencing have been illustrated and noted on the plans to have sediment buildup removed after every rain event to prevent silt fence failure. All natural areas outside of the limits**

of disturbance will remain protected and will provide a vegetative buffer for most of the side and for the downstream tributary.

F. Other Controls

a. Solid materials, including building materials, shall be prevented from being discharged to Waters of the State: [X] **Yes** [ ] No

b. Off-site vehicle tracking of sediments and the generation of dust shallbe minimized through the use of:

[X] **A stabilized construction entrance and exit**

[ ] Vehicle tire washing

[ ] Other controls, describe:_____

_____

c. Temporary Sanitary Facilities: **Portable restrooms will be provided on site as required by the specifications and state and local laws.**

d. Concrete Waste Area Provided:

[X] **Yes**

[ ] No. Concrete is used on the site, but no concrete washout is provided.

Explain why: _____

_____

[ ] N/A, no concrete will be used with this project

e. Fuel Storage Areas, Hazardous Waste Storage, and Truck Wash Areas: **Fuel and hazardous waste shall not be stored on site. Truck wash areas provided at concrete waste area locations.**

G. Non-Stormwater Discharges

a. The following allowable non-stormwater discharges comingled with stormwater are present or anticipated at the site:

[ ] Fire-fighting activities;

[X] **Fire hydrant flushings;**

[X] **Water used to wash vehicles (where detergents or other chemicals are not used) or control dust in accordance with Part II.A.4.H.2;**

[X] **Potable water sources including uncontaminated waterline flushings;**

[X] **Landscape Irrigation;**

[X] **Routine external building wash down which does not use detergents or other chemicals;**

[X] **Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled materials have been removed) and where detergents or other chemicals are not used**;

[X] **Uncontaminated air conditioning, compressor condensate (See Part I.B.12.C of the permit);,**

[X] **Uncontaminated springs, excavation dewatering and groundwater**

(See Part I.B.13.C of the permit);

☒ **Foundation or footing drains where flows are not contaminated with process materials such as solvents (See Part I.B.13.C of the permit);**

b. Describe any controls associated with non-stormwater discharges present at the site: **Vehicle, equipment, and concrete wash stations are provided to control wash water for vehicle and equipment washing. A filtering system or settling basin will be used for treating the water from excavation.**

H. Applicable State or Local Programs: The SWPPP will be updated as necessary to reflect any revisions to applicable federal, state, or local requirements that affect the stormwater controls implemented at the site. ☒ **Yes** ☐ No

I. Inspections

a. Inspection frequency:

☒ **Every 7 calendar days**

or

☐ At least once every 14 calendar days and within 24 hours of the end of a storm even 0.25 inches or greater (a rain gauge must be maintained on-site)

b. Inspections:

Completed inspection forms will be kept with the SWPPP.

☒ **ADEQ's inspection form will be used (See Appendix B)**

or

☐ A form other than ADEQ's inspection form will be used and is attached (See inspection form requirements Part II.A.4.L.2)

c. Inspection records will be retained as part of the SWPPP for at least 3 years from the date of termination.

d. It is understood that the following sections describe waivers of site inspection requirements. All applicable documentation requirements will be followed in accordance with the referenced sections.

i. Winter Conditions (Part II.A.4.L.4)

ii. Adverse Weather Conditions (Part II.A.4.L.5)

J. Maintenance:

The following procedures to maintain vegetation, erosion and sediment control measures and other protective measures in good, effective operating condition will be followed: **Weekly site inspections and repair to any structural BMP that has been damaged or observed to have failed. Removal of sediment from upstream side of check dams, silt fence and inlet protections. Watering of seed and plantings to promote root growth. Erosion control matting installation as applicable.**

Any necessary repairs will be completed, when practicable, before the next storm

event, but not to exceed a period of 3 business days of discovery, or as otherwise directed by state or local officials.

K. Employee Training:

The following is a description of the training plan for personnel (including contractors and subcontractors) on this project: : **Contractor shall provide properly trained staff for installing or maintaining the requirements of the SWPPP, sediment and erosion control requirements, and permit details. Training may be provided by EDG at the Contractors request and shall include General Contractor, Superintendent, and any sub-contractors performing installation or maintenance of the erosion and sediment controls, or weekly inspections and reporting.**

**Note, Formal training classes given by Universities or other third-party organizations are not required, but recommended for qualified trainers; the permittee is responsible for the content of the training being adequate for personnel to implement the requirements of the permit.

Certification

"I certify under penalty of law that this document and all attachments such as Inspection Form were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Responsible or Cognizant Official: _____

Title: _____ Date: _____

ARR150000 Inspection Form

Appendix A

Inspector Name:_____ Date of Inspection: _____

Inspector Title: _____

Date of Rainfall:_____ Duration of Rainfall: _____

Days Since Last Rain Event:_____days Rainfall Since Last Rain Event:_____inches

Description of any Discharges During Inspection: _____

Location of Discharges of Sediment/Other Pollutant (specify pollutant & location): _____

_____

Locations in Need of Additional BMPs: _____

Information on Location of Construction Activities

Location	Activity Begin Date	Activity Occuring Now (y/n)?	Activity Ceased Date	Stabilization Initiated Date	Stabilization Complete Date

Information on BMPs in Need of Maintenance

Location	In Working Order?	Maintenance Scheduled Date	Maintenance Completed Date	Maintenance to be Performed By

Changes required to the SWPPP:_____ Reasons for changes: _____

_____ _____

_____ _____

SWPPP changes completed (date): _____

"I certify under penalty of law that this document and all attachments such as Inspection Form were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Responsible or Cognizant Official: _____Date:_____

Title: _____

BMP Consideration Checklist

Appendix B

The BMPs listed here should be considered for every project. Those BMPs that are not included in the SWPPP should be checked as "Not Used" with a brief statement describing why it is not being used.

Note: Appendix B and C do not have to be submitted with the SWPPP. These attachments are for use during the development of the SWPPP.

EROSION CONTROL BMPs				
BMP	**BMP Considered for project**	**BMP Used**	**BMP Not Used**	**If not used, state reason**
EC-1 Scheduling	☐	☐	☐	
EC-2 Preservation of Existing Vegetation	☐	☐	☐	
EC-3 Hydraulic Mulch	☐	☐	☐	
EC-4 Hydroseeding	☐	☐	☐	
EC-5 Soil Binders	☐	☐	☐	
EC-6 Straw Mulch	☐	☐	☐	
EC-7 Geotextiles & Mats	☐	☐	☐	
EC-8 Wood Mulching	☐	☐	☐	
EC-9 Earth Dikes & Drainage Swales	☐	☐	☐	
EC-10 Velocity Dissipation Devices	☐	☐	☐	
EC-11 Slope Drains	☐	☐	☐	
EC-12 Stream bank Stabilization	☐	☐	☐	
SEDIMENT CONTROL BMPs				
BMP	**BMP Considered for project**	**BMP Used**	**BMP Not Used**	**If not used, state reason**
SE-1 Silt Fence	☐	☐	☐	
SE-2 Sediment Basin	☐	☐	☐	
SE-3 Sediment Trap	☐	☐	☐	
SE-4 Check Dam	☐	☐	☐	
SE-5 Fiber Rolls	☐	☐	☐	
SE-6 Gravel Bag Berm	☐	☐	☐	
SE-7 Street Sweeping and Vacuuming	☐	☐	☐	
SE-8 Sand Bag Barrier	☐	☐	☐	
SE-9 Straw Bale Barrier	☐	☐	☐	
SE-10 Storm Drain Inlet Protection	☐	☐	☐	
SE-11 Chemical Treatment	☐	☐	☐	
WIND EROSION CONTROL BMPs				
BMP	**BMP Considered for project**	**BMP Used**	**BMP Not Used**	**If not used, state reason**
WE-1 Wind Erosion Control	☐	☐	☐	

BMP Consideration Checklist

Appendix B

TRACKING CONTROL BMPs				
BMP	**BMP Considered for project**	**BMP Used**	**BMP Not Used**	**If not used, state reason**
TR-1 Stabilized Construction Entrance/Exit	☐	☐	☐	
TR-2 Stabilized Construction Roadway	☐	☐	☐	
TR-3 Entrance/Outlet Tire Wash	☐	☐	☐	
NON-STORM WATER MANAGEMENT BMPs				
BMP	**BMP Considered for project**	**BMP Used**	**BMP Not Used**	**If not used, state reason**
NS-1 Water Conservation Practices	☐	☐	☐	
NS-2 Dewatering Operations	☐	☐	☐	
NS-3 Paving and Grinding Operations	☐	☐	☐	
NS-4 Temporary Stream Crossing	☐	☐	☐	
NS-5 Clear Water Diversion	☐	☐	☐	
NS-6 Illicit Connection/ Discharge	☐	☐	☐	
NS-7 Potable Water/Irrigation	☐	☐	☐	
NS-8 Vehicle and Equipment Cleaning	☐	☐	☐	
NS-9 Vehicle and Equipment Fueling	☐	☐	☐	
NS-10 Vehicle and Equipment Maintenance	☐	☐	☐	
NS-11 Pile Driving Operations	☐	☐	☐	
NS-12 Concrete Curing	☐	☐	☐	
NS-13 Concrete Finishing	☐	☐	☐	
NS-14 Material and Equipment Use Over Water	☐	☐	☐	
NS-15 Demolition Adjacent to Water	☐	☐	☐	
NS-16 Temporary Batch Plants	☐	☐	☐	
WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL BMPs				
BMP	**BMP Considered for project**	**BMP Used**	**BMP Not Used**	**If not used, state reason**
WM-1 Material Delivery and Storage	☐	☐	☐	
WM-2 Material Use	☐	☐	☐	
WM-3 Stockpile Management	☐	☐	☐	
WM-4 Spill Prevention and Control	☐	☐	☐	
WM-5 Solid Waste Management	☐	☐	☐	
WM-6 Hazardous Waste Management	☐	☐	☐	
WM-7 Contaminated Soil Management	☐	☐	☐	
WM-8 Concrete Waste Management	☐	☐	☐	
WM-9 Sanitary/Septic Waste Management	☐	☐	☐	
WM-10 Liquid Waste Management	☐	☐	☐	

SWPPP Completion Checklist

Appendix C

Yes = Complete
No = Incomplete/Deficient
N/A = Not applicable to project

Yes	No	N/A	A. A site description, including:	Permit S ection
			1. Project description, intended use after NOT	Part II.A.4.A.1
			2. Sequence of major activities	Part II.A.4.A.2
			3. Total & disturbed acreage	Part II.A.4.A.3
			B. Responsible Parties: All parties dealing with the S WPPP and the areas they are responsible for on-site.	Part II.A.4.B
			C. Receiving Water.	Part II.A.4.C
			-M S4 Name	Part II.A.4.C
			-Ultimate Receiving Water	Part II.A.4.C
			D.S ite Map --- S ee End of Evaluation Form	Part II.A.4.F
			E. Description of Controls:	
			1. Erosion and sediment controls, including:	
			a. Initial site stabilization	Part II.A.4.G.1.a
			b. Erosion and sediment controls	Part II.A.4.G.1.b
			c. Replacement of inadequate controls	Part II.A.4.G.1.c
			d. Removal of off-site accumulations	Part II.A.4.G.1.d
			e. M aintenance of sediment traps/basins @ 50% capacity	Part II.A.4.G.1.e
			f. Litter, construction debris and chemicals properly handled	Part II.A.4.G.1.f
			g. Off-site storage areas and controls	Part II.A.4.G.1.g
			2. Stabilization practices:	
			a. Description and schedule for stabilization	Part II.A.4.G.2.a
			b. Description of buffer areas	Part II.A.4.G.2.b
			c. Records of stabilization	Part II.A.4.G.2.c
			d. Deadlines for stabilization	Part II.A.4.G.2.d
			3. Structural Practices:	
			-Describe structural practices to divert flows, store flows, or otherwise limit runoff	Part II.A.4.G.3
			a. Sediment basins	Part II.A.4.G.3.a.1
			-Are more than 10 acres draining to a common point? If so, are sediment basins included?	Part II.A.4.G.3.a.1
			-Sediment basin dimensions and capacity description and calculations	Part II.A.4.G.3.a.1
			-If a basin wasn't practicable, are other controls sufficient?	Part II.A.4.G.3.a.1
			b. Velocity dissipation devices concentrated flow from 2 or more acres	Part II.A.4.G.3.b
			F. Other controls including:	
			1. Solid waste control measures	Part II.A.4.H.1
			2. Vehicle off-site tracking controls	Part II.A.4.H.2
			3. Compliance with sanitary waste disposal	Part II.A.4.H.4
			4. Does the site have a concrete washout area controls?	Part II.A.4.H.5
			5. Does the site have fuel storage areas, hazardous waste storage and/or truck wash areas controls?	Part II.A.4.H.6
			G. Identification of allowable non-storm water discharges	Part II.A.4.I
			-Appropriate controls for dewatering, if present	Part I.B.12.C
			H. S tate or local requirements incorporated into the plan.	Part II.A.4.K

SWPPP Completion Checklist

Appendix C

Yes = Complete
No = Incomplete/Deficient
N/A = Not applicable to project

Yes	No	N/A	I. Inspections	Permit S ection
			1. Inspection frequency listed?	Part II.A.4.L.1
			2. Inspection form	Part II.A.4.L.2
			Ours.	
			If not ours, does it contain the following items:	
			a. Inspector name and title	Part II.A.4.L.2.a
			b. Date of inspection.	Part II.A.4.L.2.b
			c. Amount of rainfall and days since last rain event (14 day only)	Part II.A.4.L.2.c
			d. Approx beginning and duration of storm event	Part II.A.4.L.2.d
			e. Description of any discharges during inspection	Part II.A.4.L.2.e
			f. Locations of discharges of sediment/other pollutants	Part II.A.4.L.2.f
			g. BM Ps in need of maintenance	Part II.A.4.L.2.g
			h. BM Ps in working order, if maintenance needed (scheduled and completed)	Part II.A.4.L.2.h
			i. Locations that are in need of additional controls	Part II.A.4.L.2.i
			j. Location and dates when major construction activities begin, occur or cease	Part II.A.4.L.2.j
			k. Signature of responsible/cognizant official	Part II.A.4.L.2.k
			3. Inspection Records	Part II.A.4.L.3
			4. Winter Conditions	Part II.A.4.L.4
			5. Adverse Weather Conditions	Part II.A.4.L.5
			J. Maintenance Procedures	Part II.A.4.M
			K. Employee Training	Part II.A.4.N
			S igned Plan Certification	Part II.A.7. and Part II.B.10
			D. S ite Map showing:	
			1. Pre-construction topographic view	Part II.A.4.F.1
			2. Drainage flow	Part II.A.4.F.2
			3. Approximate slopes after grading activities	Part II.A.4.F.2
			4. Areas of soil disturbance and areas not disturbed	Part II.A.4.F.3
			5. Location of major structural and non-structural controls.	Part II.A.4.F.4
			6. Location of main construction entrance and exit.	Part II.A.4.F.5
			7. Areas where stabilization practices are expected to occur.	Part II.A.4.F.6
			8. Locations of off-site materials, waste, borrow area or storage area.	Part II.A.4.F.7
			9. Locations of areas used for concrete wash-out.	Part II.A.4.F.8
			10. Locations of surface waters on site.	Part II.A.4.F.9
			11. Locations where water is discharged to a surface water or M S4.	Part II.A.4.F.10
			12. Storm water discharge locations.	Part II.A.4.F.11
			13. Areas where final stabilization has been accomplished.	Part II.A.4.F.12

SITE WITH AUTOMATIC COVERAGE (LESS THAN 5 ACRES) CONSTRUCTION SITE NOTICE

FOR THE
Division of Environmental Quality (DEQ)
Stormwater Program

NPDES GENERAL PERMIT NO. ARR150000

The following information is posted in compliance with **Part I.B.8.a** of the DEQ General Permit Number **ARR150000** for discharges of stormwater runoff from sites with automatic coverage. Additional information regarding the DEQ stormwater program may be found on the internet at:
www.adeq.state.ar.us/water/branch_npdes/stormwater

Permit Number	ARR150000
Contact Name: Phone Number:	Arkansas Department of Veterans Affairs
Project Description (Name, Location, etc.): Start Date: End Date: Total Acres:	Arkansas State Veterans Cemetery – Birdeye Phase 2, 3600 HWY 163, Birdeye, Arkansas 4.35 AC
Location of Stormwater Pollution Prevention Plan:	SWPPP Mailbox near job trailer

Does this construction activity take place, and does the stormwater discharge occur within the drainage area addressed by a TMDL?

_____YES ____X___NO

For Construction Sites Authorized under **Part I.B.6.a** (Automatic Coverage) the following certification must be completed:

I Owner/Operator (Typed or Printed Name of Person Completing this Certification) certify under penalty of law that I have read and understand the eligibility requirements for claiming an authorization under Part I.B.2. of the DEQ General Permit Number ARR150000. A stormwater pollution prevention plan has been developed and implemented according to the requirements contained in Part II.A.2.B & D of the permit. I am aware there are significant penalties for providing false information or for conducted unauthorized discharges, including the possibility of fine and imprisonment for knowing violations.

Signature and Title

Date

SECTION 01 22 00

UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for unit prices.

B. Related Requirements:

1. Section 012900 "Payment Procedures" for procedures for submitting and handling Change Orders.

1.2 DEFINITIONS

A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Unit Price No. 01 - Crypt Underdrain Drainage Gravel (Clean, Washed):

1. Description: This shall be compensation for all costs associated with the Contractor's construction of the crypt underdrain drainage gravel including all installation, labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Cubic Yard (CY).

B. Unit Price No.2 - #57 Drainage Stone (Clean Washed)

1. Description: This shall be compensation for all costs associated with the Contractor's construction of #57 drainage stone including all installation, labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Cubic Yard (CY)

C. Unit Price No.3 – Earthwork

1. Description: This shall be compensation for all costs associated with the Contractor's regular excavation, minor structure excavation, grading, minimum 1'-0" undercut for all areas, and material disposal, as necessary to accommodate the proposed improvements.
2. Unit of Measurement: Cubic Yard (CY)

D. Unit Price No.4 - Onsite General Fill (Placed & Compacted)

1. Description: This shall be compensation for all costs associated with all onsite general fill needed for this project including labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Cubic Yard (CY)

E. Unit Price No.5 - Offsite General Fill (Placed & Compacted)

1. Description: This shall be compensation for all costs associated with all offsite general fill needed for this project including labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Cubic Yard (CY)

F. Unit Price No.6 – Export Material

1. Description: This shall be compensation for all costs associated with all export material needed for this project including labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Cubic Yard (CY)

G. Unit Price No.7 – Engineered Fill (Placed & Compacted)

1. Description: This shall be compensation for all costs associated with all engineered fill needed for this project including labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Cubic Yard (CY)

H. Unit Price No.8 – Class 7 Base (Placed & Compacted)

1. Description: This shall be compensation for all costs associated with the Contractor's construction of Class 7 base including all installation, labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Cubic Yard (CY)

I. Unit Price No.9 – Double Depth Concrete Crypts Installed (Concrete Vault Not in Contract, By Others)

1. Description: This shall be compensation for all costs associated with installation of the double depth concrete crypts including labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Each (EA)

J. Unit Price No.10 – Oversized Double Depth Concrete Crypts Installed (Concrete Vault Not in Contract, By Others)

1. Description: This shall be compensation for all costs associated with installation of the oversized double depth concrete crypts including labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Each (EA)

K. Unit Price No.11 – Barrier Curb & Gutter

1. Description: This shall be compensation for all costs associated with the Contractor's construction of barrier curb & gutter including all installation, labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Linear Feet (LF)

L. Unit Price No.12 – 12x12 ADA Pavers

1. Description: This shall be compensation for all costs associated with the Contractor's construction of 12x12 ADA pavers including all installation, labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Square Feet (SF)

M. Unit Price No.13 – Asphalt Repair (seal cracks)

1. Description: This shall be compensation for all costs associated with asphalt repair needed for this project including labor, materials, and all other appurtenances need to accommodate the proposed improvements.
2. Unit of Measurement: Linear Feet (LF)

N. Unit Price No.14 – Concrete Sidewalk (Placed)

1. Description: This shall be compensation for all costs associated with the Contractor's construction of concrete sidewalk including all installation, labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Square Yard (SY)

O. Unit Price No.15– Nyloplast Basin

1. Description: This shall be compensation for all costs associated with installation of nyloplast basin including excavation, backfill, subbase, labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Each (EA)

P. Unit Price No.16 – Concrete Junction Box

1. Description: This shall be compensation for all costs associated with installation of concrete junction box including excavation, backfill, subbase, labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Each (EA)

Q. Unit Price No.17 – Sump Pump

1. Description: This shall be compensation for all costs associated with installation of sump pump including labor, materials, and other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Each (EA)

R. Unit Price No.18 – Crypt Underdrain

1. Description: This shall be compensation for all costs associated with installation of crypt underdrain including furnishings, fittings, trenching, bedding, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Linear Feet (LF)

S. Unit Price No.19 – Typical Underdrain Trench

1. Description: This shall be compensation for all costs associated with installation of typical underdrain trench including furnishings, fittings, trenching, bedding, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Linear Feet (LF)

T. Unit Price No.20 – Section K Underdrain

1. Description: This shall be compensation for all costs associated with installation of section k underdrain including furnishings, fittings, trenching, bedding, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Linear Feet (LF)

U. Unit Price No.21 - Cleanouts

1. Description: This shall be compensation for all costs associated with installation of cleanouts including excavation, backfill, subbase, labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Each (EA)

V. Unit Price No.22 – 3x3 Gabion Baskets (Fill with Rock)

1. Description: This shall be compensation for all costs associated with the Contractor's construction of 3x3 gabion baskets including all concrete, reinforcement, forming, installation, labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Each (EA)

W. Unit Price No.23 – Commercial Fan

1. Description: This shall be compensation for all costs associated with installation of commercial fan including labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Each (EA)

X. Unit Price No.24 – 3" Caliper (Planted)

1. Description: This shall be compensation for all costs associated with installation of tree, fertilizer tablets, mycoorhizae, mulch, lodge poles, guy wires, trimming, planting, and all other appurtenance needed to accommodate the proposed improvements.
2. Unit of Measurement: Each (EA)

Y. Unit Price No.25 – 4" Caliper (Planted)

1. Description: This shall be compensation for all costs associated with installation of tree, fertilizer tablets, mycoorhizae, mulch, lodge poles, guy wires, trimming, planting, and all other appurtenance needed to accommodate the proposed improvements.
2. Unit of Measurement: Each (EA)

Z. Unit Price No.24 – 6" Caliper (Planted)

1. Description: This shall be compensation for all costs associated with installation of tree, fertilizer tablets, mycoorhizae, mulch, lodge poles, guy wires, trimming, planting, and all other appurtenance needed to accommodate the proposed improvements.
2. Unit of Measurement: Each (EA)

AA. Unit Price No. 27 – Seed Mix (Planted)

1. Description: This shall be compensation for all costs associated with the Contractor's installation of seed mix including labor, materials, and all other appurtenance needed to completely install seed mix.
2. Unit of Measurement: Square Feet (SF).

BB. Unit Price No. 28 – Tubers (Planted)

1. Description: This shall be compensation for all costs associated with the Contractor's installation of tubers including labor, materials, and all other appurtenance needed to completely install tubers.
2. Unit of Measurement: Each (EA)

CC. Unit Price No. 29 – Topsoil (Placed & Compacted)

1. Description: This shall be compensation for all costs associated with the Contractor's installation of topsoil including labor, materials, and all other appurtenance needed to completely install topsoil.
2. Unit of Measurement: Cubic Yard (CY)

DD. Unit Price No. 30 - Sod

1. Description: This shall be compensation for all costs associated with the Contractor's installation of sod including labor, materials, and all other appurtenances needed to completely install sod.
2. Unit of Measurement: Square Yard (SY)

EE. Unit Price No. 31 - Tree Removal

1. Description: This shall be compensation for all costs associated with the Contractor's removal of trees as prescribed herein and for all materials, labor, tools, equipment, and incidentals necessary to complete the work.
2. Unit of Measurement: Each (EA).

FF. Unit Price No. 32 – Broadband Conduit

1. Description: This shall be compensation for all costs associated with installation of broadband conduit including labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Linear Feet (LF)

GG. Unit Price No. 33 – Electrical Conduit

1. Description: This shall be compensation for all costs associated with installation of electrical conduit including labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Linear Feet (LF)

HH. Unit Price No. 34 – Columbarium Column Repair

1. Description: This shall be compensation for all costs associated with installation of columbarium column repair including labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Lump Sum (LS)

II. Unit Price No. 35 – Sediment Removal from Existing RCP

1. Description: This shall be compensation for all costs associated with sediment removal from existing RCP including labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Linear Feet (LF)

JJ. Unit Price No. 36 – Burial Control Markers

1. Description: This shall be compensation for all costs associated with installation of burial control markers including labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Each (EA)

KK. Unit Price No. 37 – Generator

1. Description: This shall be compensation for all costs associated with installation of generator including labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Each (EA)

LL. Unit Price No. 38 – Surge Protector Device (SPD)

1. Description: This shall be compensation for all costs associated with installation of surge protector device (SPD) including labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Each (EA)

MM. Unit Price No. 39 – Fan at Committal Structure

1. Description: This shall be compensation for all costs associated with installation of fan at committal structure including labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Each (EA)

NN. Unit Price No. 40 – Electrical Hand Holds

1. Description: This shall be compensation for all costs associated with installation of electrical hand holds including labor, materials, and all other appurtenances needed to accommodate the proposed improvements.
2. Unit of Measurement: Each (EA)

END OF SECTION

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SECTION 01 25 00

SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements governing General Contractor's Applications for Payment.

B. Coordinate the Schedule of Values and Applications for Payment with the Construction Schedule, List of Subcontracts, and Submittal Schedule.

1.2 RELATED SECTIONS

A. Section 00 72 13 General Conditions

B. Section 01 29 00 Payment Procedures

1.3 SCHEDULE OF VALUES

A. Coordinate preparation of the Schedule of Values with preparation of the Construction Schedule.

B. Submit the Schedule of Values to the Architect at the earliest feasible date, but in no case later than 7 calendar days before the date scheduled for submittal of the initial Application for Payment.

C. Format and Content: Use the Project Manual Table of Contents as a guide to establish the format for the Schedule of Values.

1. Identification: Include the following Project identification on the Schedule of Values:

a. Project name and location.

b. Name of the Design Firm.

c. Project number.

d. Contractor's name and address.

e. Date of submittal

D. To assist the Owner in budgeting and accounting for this project, the Contractor shall provide the following line items on the schedule of values. Values shall include line items for units of measure, cost of materials, cost of labor and total cost.

1. Mobilization cost to include but not be limited to,

a. Bonds & Insurance,

b. Shop Drawings,

c. Project Management

d. Demobilization and Closeout

2. Overhead & Profit
3. Demolition cost.
4. Allowance items specified.
5. HVAC (ductwork, supports, dampers, & air devices).
6. Electrical.
7. Site work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Division 01 Section "Unit Prices" for administrative requirements governing the use of unit prices.

1.2 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

   a. Application for Payment forms with continuation sheets.
   b. Submittal schedule.
   c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Architect at earliest possible date but no later than seven (7) days before the date scheduled for submittal of initial Applications for Payment.
3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

   a. Project name and location.
   b. Name of Architect.
   c. Architect's project number.
   d. Contractor's name and address.
   e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703.

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents.

4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

9. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

    1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Times: Submit Application for Payment to Architect by the 15th day of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.

D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703.

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

    1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
    2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

F. Transmittal: Submit three (3) signed and notarized original copies of each Application for Payment to Architect. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. LEED submittal for project materials cost data.
4. Contractor's construction schedule (preliminary if not final).
5. LEED action plans.
6. Schedule of unit prices.
7. Submittal schedule (preliminary if not final).
8. List of Contractor's staff assignments.
9. List of Contractor's principal consultants.
10. Copies of building permits.
11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
12. Initial progress report.
13. Report of preconstruction conference.
14. Certificates of insurance and insurance policies.

I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.

3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706-1994, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A-1994, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707-1994, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action.

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.3 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic copies of digital data files of the Contract Drawings will[not] be provided by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.

a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Include the following information for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Name of subcontractor.
    f. Name of supplier.
    g. Name of manufacturer.
    h. Submittal number or other unique identifier, including revision identifier.

        1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

    i. Number and title of appropriate Specification Section.
    j. Drawing number and detail references, as appropriate.
    k. Location(s) where product is to be installed, as appropriate.
    l. Other necessary identification.

3. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

    a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

4. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form.

    a. Transmittal Form for Paper Submittals: Use AIA Document G810.
    b. Transmittal Form for Paper Submittals: Provide locations on form for the following information:

        1) Project name.
        2) Date.
        3) Destination (To:).
        4) Source (From:).
        5) Name and address of Architect.
        6) Name of Construction Manager.
        7) Name of Contractor.
        8) Name of firm or entity that prepared submittal.
        9) Names of subcontractor, manufacturer, and supplier.
        10) Category and type of submittal.
        11) Submittal purpose and description.
        12) Specification Section number and title.
        13) Specification paragraph number or drawing designation and generic name for each of multiple items.
        14) Drawing number and detail references, as appropriate.
        15) Indication of full or partial submittal.
        16) Transmittal number[, numbered consecutively].
        17) Submittal and transmittal distribution record.
        18) Remarks.
        19) Signature of transmitter.

E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.

    a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:

    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name of Construction Manager.
    e. Name of Contractor.
    f. Name of firm or entity that prepared submittal.
    g. Names of subcontractor, manufacturer, and supplier.

h. Category and type of submittal.
i. Submittal purpose and description.
j. Specification Section number and title.
k. Specification paragraph number or drawing designation and generic name for each of multiple items.
l. Drawing number and detail references, as appropriate.
m. Location(s) where product is to be installed, as appropriate.
n. Related physical samples submitted directly.
o. Indication of full or partial submittal.
p. Transmittal number.
q. Submittal and transmittal distribution record.
r. Other necessary identification.
s. Remarks.

5. Metadata: Include the following information as keywords in the electronic submittal file metadata:

a. Project name.
b. Number and title of appropriate Specification Section.
c. Manufacturer name.
d. Product name.

F. Options: Identify options requiring selection by Architect.

G. Deviations: Identify deviations from the Contract Documents on submittals.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:

1. Submit electronic submittals via email as PDF electronic files.

a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer's catalog cuts.
b. Manufacturer's product specifications.
c. Standard color charts.
d. Statement of compliance with specified referenced standards.
e. Testing by recognized testing agency.
f. Application of testing agency labels and seals.
g. Notation of coordination requirements.
h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

a. Wiring diagrams showing factory-installed wiring.
b. Printed performance curves.
c. Operational range diagrams.
d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:

a. PDF electronic file.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identification of products.
b. Schedules.
c. Compliance with specified standards.

d. Notation of coordination requirements.
e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
g. Seal and signature of professional engineer if specified.

2. Submit Shop Drawings in the following format:

a. PDF electronic file.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of applicable Specification Section.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

a. Number of Samples: Submit 1 full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. Number of Samples: Submit 1 sets of Samples.

1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least 1 sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Submit product schedule in the following format:

a. PDF electronic file.

F. Coordination Drawings Submittals: Comply with requirements specified in Division 01 Section "Project Management and Coordination."

G. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."

H. Application for Payment and Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."

I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."

J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."

K. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."

L. LEED Submittals: Comply with requirements specified in Division 01 sustainable design requirements Section.

M. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

N. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

O. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

P. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

Q. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

R. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

S. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

T. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

U. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

V. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section "Quality Requirements."

W. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

X. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

Y. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

Z. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION

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SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.2 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to Architect, testing agencies, and authorities having jurisdiction.

B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.3 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of ADEQ Construction General Permit or authorities having jurisdiction, whichever is more stringent.

C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire prevention program.

1.4 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in AHTD Highway Standards.

1.5 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch (50-mm), thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

C. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

E. Heating[and Cooling]: Provide temporary heating[and cooling] required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

G. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

H. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead unless otherwise indicated.
2. Connect temporary service to Owner's existing power source, as directed by Owner.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:
   1. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas [as indicated] [within construction limits indicated] on Drawings.

   1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

   1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
   2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Division 31 Section "Earth Moving."
   3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
   4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 32 Section "Asphalt Paving."

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

   1. Protect existing site improvements to remain including curbs, pavement, and utilities.
   2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

   1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
   2. Remove snow and ice as required to minimize accumulations.

F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

   1. Identification Signs: Provide Project identification signs as indicated on Drawings.
   2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

      a. Provide temporary, directional signs for construction personnel and visitors.

   3. Maintain and touchup signs so they are legible at all times.

G. Waste Disposal Facilities: Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."

H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Division 01 Section "Execution."

I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Temporary Erosion and Sedimentation Control: Comply with ADEQ requirements.

D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to ADEQ.

E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

F. Tree and Plant Protection: Comply with requirements specified in Division 01 Section "Temporary Tree and Plant Protection."

G. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

H. Site Enclosure Fence: Prior to commencing earthwork, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.

I. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

J. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

K. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

L. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
2. Provide walk-off mats at each entrance through temporary partition.

M. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION

SECTION 015639

TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

1.02 RELATED REQUIREMENTS

A. Section 31 1000 - Site Clearing: Limits on clearing; disposition of vegetative clearing debris.

B. Section 31 2000 - Earthwork: Temporary and permanent grade changes for erosion control.

C. Section 32 1123 - Aggregate Base Courses: Temporary and permanent roadways.

1.03 DEFINITIONS

A. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

B. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated defined by a circle concentric with each tree with a radius 12 times the tree's caliper size and with a minimum radius of 96 inches unless otherwise indicated. Reference Demo and Tree Preservation Plan for tree protection fence locations.

1.04 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.05 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include plans, elevations, sections, and locations of protection-zone fencing and signage, showing relation of equipment-movement routes and material storage locations with protection zones.

C. Samples: For each type of the following:

1. Organic Mulch: Sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.

2. Protection-Zone Fencing: Assembled Samples.

3. Protection-Zone Signage: Full-size Samples.

D. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.

1.06 INFORMATIONAL SUBMITTALS

A. Certification: From ISA Certified Arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

B. Maintenance Recommendations: From ISA Certified Arborist, for care and protection of trees affected by construction during and after completing the Work.

C. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

1.07 QUALITY ASSURANCE

A. Arborist Qualifications: Certified Arborist as certified by ISA, licensed arborist in jurisdiction where Project is located, current member of ASCA, or registered Consulting Arborist as designated by ASCA.

1.08 FIELD CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.

2. Moving or parking vehicles or equipment.

3. Foot traffic.

4. Erection of sheds or structures.

5. Impoundment of water.

6. Excavation or other digging unless otherwise indicated.

7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Backfill Soil: Stockpiled soil mixed with planting soil of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of

coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.

1. Mixture: Well-blended mix of two parts stockpiled soil to one part planting soil.
2. Planting Soil: Planting soil as specified in Section 329200 "Soil Preparation".

B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:

1. Type: Shredded hardwood.

C. Protection-Zone Fencing: Fencing fixed in position and meeting one of the following requirements: Previously used materials may be used when approved by Engineer.

1. Chain-Link Protection-Zone Fencing: Galvanized-steel fencing fabricated from minimum 2-inch opening, 0.148-inch- diameter wire chain-link fabric; with pipe posts, minimum 2-3/8-inch- OD line posts, and 2-7/8-inch- OD corner and pull posts; with 1-5/8-inch- OD top rails and 0.177-inch- diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system.
   a. Height: 48 inches

2. Plywood Protection-Zone Fencing: Plywood framed with four 2-by-4-inch rails, with 4-by-4-inch preservative-treated wood posts spaced not more than 96 inches apart.
   a. Height: 48 inches.

3. Wood Protection-Zone Fencing: Constructed of two 2-by-4-inch (50-by-100-mm) horizontal rails, with 4-by-4-inch (100-by-100-mm) preservative-treated wood posts spaced not more than 96 inches (2400 mm) apart, and lower rail set halfway between top rail and ground.
   a. Height: 48 inches.

4. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch (50-mm) maximum opening in pattern and supported by tubular or T-shape galvanized-steel posts spaced not more than 96 inches (2400 mm) apart. High-visibility orange color.
   a. Height: 48 inches.

5. Gates: Swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones.

D. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering, stating “Notice: Tree Preservation Area DO NOT ENTER” or other verbiage as required by Urban Forester for the jurisdiction in which work will take place.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from

construction areas or generated by construction activity do not enter or cross protection zones.

B. Tree-Protection Area: An Arborist shall examine all trees to remain and assess the health and maintenance needed for each individual tree. A report shall be generated from the Arborist and submitted to the Contractor, Owner and Landscape Architect.

3.02 PREPARATION

A. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

B. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated. Do not exceed indicated thickness of mulch.

1. Apply 4-inch uniform thickness of organic mulch unless otherwise indicated. Do not place mulch within 6 inches of tree trunks.

3.03 PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones in a manner that will prevent people from easily entering protected areas except by entrance gates.

1. Chain-Link Fencing: Install to comply with ASTM F 567 and with manufacturer's written instructions.

2. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Landscape Architect.

3. Access Gates: Install where indicated.

B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Landscape Architect.

C. Maintain protection zones free of weeds and trash.

D. Maintain protection-zone fencing and signage in good condition as acceptable to Landscape Architect and remove when construction operations are complete, and equipment has been removed from the site.

3.04 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 312000 "Earth Moving" unless otherwise indicated.

B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.

C. Do not allow exposed roots to dry out before placing permanent backfill.

3.05 ROOT PRUNING

A. Prune tree roots that are affected by temporary and permanent construction. Prune roots as follows:

1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.

2. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.

3. Cover exposed roots with burlap or mulch and water regularly.

4. Backfill as soon as possible according to requirements in Section 312000 "Earth Moving."

B. Root Pruning at Edge of Protection Zone: Expose roots by hand or using an air spade. Prune tree roots by cleanly cutting all roots to the depth of the required excavation.

C. Root Pruning within Protection Zone: Clear and excavate by hand or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow-tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

3.06 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches as directed by arborist.

1. Prune to remove only injured, broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.

2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.

3. Pruning Standards: Prune trees according to ANSI A300 and/or as indicated on Drawings.

B. Cut branches with sharp pruning instruments; do not break or chop.

C. Do not paint or apply sealants to wounds.

D. Chip removed branches and spread over areas identified by Engineer.

3.07 REGRADING

A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

B. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

C. Minor Fill within Protection Zone: Where existing grade is 2 inches or less below elevation of finish grade, fill with backfill soil approved by Landscape Architect. Place backfill soil in a single

uncompacted layer and hand grade to required finish elevations.

3.08 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

B. Reports: All trees disturbed or damaged within a tree protection area or easement are to be assessed and a report produced by an arborist. All trees to remain are to be evaluated individually in a report by an arborist. Report is to be reviewed and approved by the Landscape Architect. All associated cost of arborist and associated work recommended in reports are to be at the contractor's expense. Including but not limited to pruning, dead wooding, tree removal and legal disposal of material offsite.

3.09 REPAIR AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by the Landscape Architect.
   1. Perform repairs of damaged trunks, branches, and roots within 24 hours according to arborist's written instructions.

   2. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Landscape Architect.

B. Excess Mulch: Rake mulched area within protection zones, being careful not to injure roots. Rake to loosen and remove mulch that exceeds a 4-inch uniform thickness to remain.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove excess excavated material, displaced trees, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION

SECTION 01 57 13

TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes construction of temporary measures to control soil erosion and sediment transport within the construction limits.

1.2 REFERENCES

A. "Erosion and Sediment Control Handbook", published by McGraw-Hill Book Company.

B. American Society for Testing and Materials (ASTM):

1. ASTM D 488, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.

1.3 SUBMITTALS

A. Submit product data and specifications for approval as required by the Owner prior to use.

1.4 QUALITY ASSURANCE

A. Comply with the requirements of governmental authorities having jurisdiction.

1.5 PROJECT REQUIREMENTS

A. Obtain all required permits prior to commencement of Work in areas requiring erosion control measures.

B. The use of temporary control measures shall be coordinated with the permanent erosion control features specified elsewhere to the extent practical, to assure effective and continuous erosion control.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Mulch: Hay, straw, wood chips, or other suitable material reasonably clean of noxious weeds and deleterious material.

B. Grasses: Rye grass, cereal grasses, or other quick-growing species suitable to the area and as a temporary cover, which will not compete with the grasses specified for permanent cover.

C. Silt Fencing: "Envirofence" by Mirafi, "Propex Silt Stop" by Amoco, or equivalent. Posts shall be as shown on the Drawings.

D. Check Dams: Shall be constructed of locally available sound crushed stone; size conforming to ASTM D 448, size number 1.

PART 3 - EXECUTIONS

3.1 GENERAL

A. All Work under this contract shall be performed in such a manner that objectionable erosion shall not be created in watercourses through or adjacent to the project area.

B. The Contractor shall be responsible for the selection of appropriate temporary erosion control measures to suit the intended construction methods. The Contractor shall submit a scheme of control measures for each potentially impacted area prior to construction for approval by the Engineer.

C. Notify the Engineer and Owner in the event of conflict between these specification requirements and pollution control laws, rules or regulations of other federal, state, or local agencies.

3.2 EROSION AND SEDIMENT CONTROL

A. The Engineer shall have the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow, and fill operations and to direct the Contractor to provide immediate, permanent or temporary sediment control measures to minimize damage to adjacent property and to minimize effects on adjacent streams or other watercourses, lakes, ponds, or other areas of water impoundment.

B. Incorporate all permanent erosion control features (including seeding) into the project at the earliest practical time. Temporary control measures shall be those that are needed prior to installation of permanent control features; or that are needed temporarily to control erosion that develops during normal construction activities, but are not associated with permanent control features on the project.

C. Where erosion is likely to be a problem, clearing and grubbing operation should be so scheduled and performed that grading operations and permanent erosion control features can follow immediately thereafter, if the project conditions permit; otherwise temporary erosion control measures may be required between successive construction stages.

3.3 INSTALLATION AND MAINTENANCE OF SILT FENCING

A. Install in accordance with details shown on the Drawings and as specified in paragraphs B through E below. In slope areas greater than 30 percent slope, install two parallel silt fences.

B. Install posts at a maximum spacing of six feet, and to depth of approximately 18 inches, or as otherwise approved by the Engineer and Owner.

C. Excavate four-inch wide by four-inch deep trench along line of posts and upslope from barrier.

D. Fasten fabric to upstream side of posts using heavy-duty wire staples (at least one-inch long), tie wires or hog rings. Eight inches of the fabric shall extend into the trench.

E. Backfill trench and compact soil over the fabric.

F. Remove sediment deposits when deposits reach approximately one-half the height of the barrier. Sediment shall be placed in areas approved by the Engineer and spread uniformly over the ground surface.

G. Replace fabric when it has deteriorated, is torn, loose or no longer effectively performs.

H. Replace any silt fence that has been overtopped with two new parallel fences.

3.4 APPLICATION OF TEMPORARY GRASS AND MULCH

A. Temporary seeding shall be applied to areas lacking vegetation if no construction activities will be performed in the area for more than 30 days. Temporary seed mixtures shall be applied to such areas within 21 days of temporarily suspending work in the area.

3.5 CONSTRUCTION AND MAINTENANCE OF CHECK DAMS

A. Construct across creeks within the project limits as shown on the Drawings.

B. Inspect after each rainfall event. Make required repairs if the check dams have deteriorated to the extent that their effectiveness is reduced.

C. Remove sediment deposits when deposits reach approximately one-half the height of the dams. Sediments shall be placed in areas approved by the Engineer and spread uniformly over the ground surface.

D. Check dams shall be removed after completion of construction activities. Coarse aggregate shall be deposited on-site where approved by the Owner.

3.6 INSTALLATION AND MAINTENANCE OF OTHER EROSION CONTROL MEASURES

A. Install according to manufacturer's recommendations and standard local practice.

B. Maintenance of the installations shall be performed as required for proper erosion and sediment control until the Work is accepted by the Owner.

3.7 REMOVAL OF SILT FENCING

A. Silt fencing shall be removed when approved by the Engineer and Owner, after a sufficient stand of grass has been established on all disturbed areas.

B. Any sediment deposits remaining after silt fence is removed shall be dressed to conform with the existing grade, prepared, and seeded.

END OF SECTION

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SECTION 02 41 19

DEMOLITION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Selective demolition of built site elements.

B. Selective demolition of building elements for alterations purposes.

C. Abandonment and removal of existing utilities and utility structures.

1.2 RELATED SECTIONS

A. Section 312200 – Site Grading

1.3 REFERENCES

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2004.

1.4 SUBMITTALS

A. Site Plan: Showing:
   1. Areas for temporary construction and field offices.

B. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
   1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
   2. Identify demolition firm and submit qualifications.
   3. Include a summary of safety procedures.

C. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.5 QUALITY ASSURANCE

A. Demolition Firm: Company specializing in the type of work required.

1.6 PROJECT CONDITIONS

A. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

PART 2 PRODUCTS -- NOT USED

PART 3 - EXECUTION

3.1 SCOPE

A. Remove paving and curbs as required to accomplish new work.

B. Remove other items indicated, for salvage, relocation, and recycling.

C. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as required so that required rough grade elevations do not subside within one year after completion.

3.2 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Comply with applicable requirements of NFPA 241.
   3. Use of explosives is not permitted.
   4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   5. Provide, erect, and maintain temporary barriers and security devices.
   6. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   7. Do not close or obstruct roadways or sidewalks without permit.
   8. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
   9. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from the Owner.

C. Protect existing structures and other elements that are not to be removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

D. Hazardous Materials: Comply with 29 CFR 1926 and state and local regulations.

E. Perform demolition in a manner that maximizes salvage and recycling of materials.
   1. Dismantle existing construction and separate materials.
   2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

F. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.3 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to the owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to the owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.4 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as shown.
   2. Report discrepancies to landscape architect before disturbing existing installation.
   3. Beginning of demolition work constitutes acceptance of existing conditions.

B. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.

C. Remove existing work as indicated and as required to accomplish new work.
   1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
   2. Remove items indicated on drawings.

D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   3. Verify that abandoned services serve only abandoned facilities before removal.
   4. Remove abandoned pipe, ducts, conduits, and equipment; remove back to source of supply where possible, otherwise cap stub and tag with identification.

E. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch as specified for patching new work.

3.5 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Remove from site all materials not to be reused on site.

C. Leave site in clean condition, ready for subsequent work.

D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

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SECTION 03 10 00

CONCRETE FORMS AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Formwork for cast-in place concrete.
   2. Shoring, bracing, and anchorage.
   3. Architectural form liners.
   4. Form accessories.
   5. Form stripping.

B. Related Sections:
   1. Section 032000 - Concrete Reinforcement.
   2. Section 033000 - Cast-in-Place Concrete.

1.2 REFERENCES

A. American Concrete Institute:
   1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
   2. ACI 301 - Specifications for Structural Concrete.
   3. ACI 318 - Building Code Requirements for Structural Concrete.
   4. ACI 347 - Guide to Formwork for Concrete.

B. American Forest and Paper Association:
   1. AF&PA - National Design Specifications for Wood Construction.

C. The Engineered Wood Association:
   1. APA/EWA PS 1 - Voluntary Product Standard for Construction and Industrial Plywood.

D. American Society of Mechanical Engineers:
   1. ASME A17.1 - Safety Code for Elevators and Escalators.

E. ASTM International:
   1. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

F. West Coast Lumber Inspection Bureau:
   1. WCLIB - Standard Grading Rules for West Coast Lumber.

1.3 DESIGN REQUIREMENTS

A. Design, engineer and construct formwork, shoring and bracing to conform to code requirements to achieve concrete shape, line and dimension as indicated on Drawings.

1.4 SUBMITTALS

A. Section 013300 – Submittal procedures.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with [ACI 347] [ACI 301] [ACI 318].

B. For wood products furnished for work of this Section, comply with AF&PA.

1.6 COORDINATION

A. Coordinate this Section with other sections of work, requiring attachment of components to formwork.

PART 2 - PRODUCTS

2.1 WOOD FORM MATERIALS

A. Form Materials: At discretion of Contractor, but shall be standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.

2.2 PREFABRICATED FORMS

A. Preformed Steel Forms: Minimum 16 gage matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.

C. Pan Type: Steel or glass fiber of size and profile required.

D. Steel Forms: Sheet steel, suitably reinforced, and designed for particular use indicated on Drawings.

E. Form Liners: Smooth, durable, grainless and non-staining hardboard, unless otherwise indicated on Drawings.

F. Framing, Studding and Bracing: Stud or No. 3 structural light framing grade.

2.3 FORMWORK ACCESSORIES

A. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.4 COATINGS

A. Release agent that will not adversely affect concrete or interfere with application of coatings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify lines, levels, and centers before proceeding with formwork. Verify dimensions agree with Drawings.

B. When formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Engineer.

3.2 INSTALLATION

A. Earth Forms:
   1. Trench earth forms neatly, accurately, and at least 2 inches wider than footing widths indicated on Drawings.
   2. Trim sides and bottom of earth forms.
   3. Construct wood edge strips at top of each side of trench to secure reinforcing and prevent trench from sloughing.
   4. Form sides of footings where earth sloughs.
   5. Tamp earth forms firm and clean forms of debris and loose material before depositing concrete.

B. Formwork - General:
   1. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted.
   2. Construct forms to correct shape and dimensions, mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations.
   3. Camber forms where necessary to produce level finished soffits unless otherwise shown on Drawings.
   4. Carefully verify horizontal and vertical positions of forms. Correct misaligned or misplaced forms before placing concrete.
   5. Complete wedging and bracing before placing concrete.

C. Forms for Smooth Finish Concrete:
   1. Use steel, plywood or lined board forms.
   2. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish.
   3. Install form lining with close-fitting square joints between separate sheets without springing into place.
   4. Use full size sheets of form lines and plywood wherever possible.
   5. Tape joints to prevent protrusions in concrete.
   6. Use care in forming and stripping wood forms to protect corners and edges.
   7. Level and continue horizontal joints.
   8. Keep wood forms wet until stripped.

D. Architectural Form Liners:

1. Erect architectural side of formwork first.
2. Attach form liner to forms before installing form ties.
3. Install form liners square, with joints and pattern aligned.
4. Seal form liner joints to prevent grout leaks.
5. Dress joints and edges to match form liner pattern and texture.

E. Forms for Surfaces to Receive Membrane Waterproofing: Use plywood or steel forms. After erection of forms, tape form joints to prevent protrusions in concrete.

F. Framing, Studding and Bracing:
1. Space studs at 16 inches on center maximum for boards and 12 inches on center maximum for plywood.
2. Size framing, bracing, centering, and supporting members with sufficient strength to maintain shape and position under imposed loads from construction operations.
3. Construct beam soffits of material minimum of 2 inches thick.
4. Distribute bracing loads over base area on which bracing is erected.
5. When placed on ground, protect against undermining, settlement or accidental impact.

G. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301.

H. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

I. Obtain Architect/Engineer’s approval before framing openings in structural members not indicated on Drawings.

J. Install chamfer strips on external corners of exposed corners.

K. Install void forms in accordance with manufacturer's recommendations.

L. Do not reuse wood formwork more than 3 times for concrete surfaces to be exposed to view. Do not patch formwork.

3.3 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

C. Do not apply form release agent where concrete surfaces are indicated to receive [special finishes] [or] [applied coverings] that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

D. Reuse and Coating of Forms: Thoroughly clean forms and reapply form coating before each reuse. For exposed work, do not reuse forms with damaged faces or edges. Apply form coating to forms in accordance with manufacturer’s specifications. Do not coat forms for concrete indicated to receive “scored finish”. Apply form coatings before placing reinforcing steel.

3.4 INSTALLATION - INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Install formed openings for items to be embedded in or passing through concrete work.

B. Locate and set in place items required to be cast directly into concrete.

C. Coordinate with Work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.

3.5 FORM CLEANING

A. Clean forms as erection proceeds, to remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.6 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads and removal has been approved by Architect/Engineer.

B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

D. Leave forms in place for minimum number of days as specified in ACI 347.

3.7 ERECTION TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 301.

B. Tolerances: Construct formwork to produce completed concrete surfaces within construction tolerances specified in ACI 117.

3.8 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

C. Notify Architect/Engineer after placement of reinforcing steel in forms, but prior to placing concrete.

D. Schedule concrete placement to permit formwork inspection before placing concrete.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Provide reinforcing steel and welded wire fabric.

B. Conform to "Placing Reinforcing Bars", Recommended Practices, Joint Effort of CRSI-WCRSI, prepared under the direction of the CRSI Committee on Engineering Practice.

C. Notify Engineer when reinforcing is ready for inspection and allow sufficient time for this inspection prior to casting concrete.

1.2 RELATED SECTIONS

A. Section 033000 - Cast-in-Place Concrete.

1.3 REFERENCES

A. American Concrete Institute, 22400 West Seven Mile Road, Detroit, Michigan 48219.
   1. ACI-318-83 - Building Code Requirements for Reinforcing Concrete.

B. American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.
   1. ASTM A185 - Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.
   2. ASTM A497 - Specification for Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
   3. ASTM A615 - Specification for Deformed and Plain Billet-Steel for Concrete Reinforcement.

C. American Welding Society, 550 North West LeJeune Road, Miami, Florida 33126.
   1. AWS D1.4-79 - Structural Welding Code; Reinforcing Steel.

D. Concrete Reinforcing Steel Institute, 933 North Plum Grove Road, Schamburg, Illinois 60195.
   1. CRSI-MSP-1-86 - Manual of Standard Practice.

1.4 SUBMITTALS

A. Submit the following in accordance with Section 010000 General Requirements:
   1. Bending lists.
   2. Placing drawings.
   3. Shop drawings.

B. Shop Drawings:
   1. Bars for footings, including dowels, shall not be fabricated and shipped without prior review of Shop Drawings by the Engineer.
   2. Otherwise, Shop and Placing Drawings shall include reinforcing placing plans and details indicating size, location, arrangement, placing sequence, etc., and shall conform to ACI 315.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Steel:
   1. Deliver with suitable hauling and handling equipment.
   2. Tag for easy identification.
   3. Store to prevent contact with the ground.

B. Unloading, storing, and handling of bars shall conform to CRSI publication "Placing Reinforcing Bars".

PART 2 - PRODUCTS

2.1 DEFORMED REINFORCING BARS

A. Deformed billet-steel bars conforming to ASTM A615, Grade 60.

2.2 WELDED WIRE FABRIC

A. Conform to ASTM A185 or A497.

2.3 ACCESSORIES

A. Tie wire: 16-gage, black, soft-annealed wire.

B. Bar supports: proper type for intended use.

C. Bar supports in beams, columns, walls, and slabs exposed to view after stripping: Small rectangular concrete blocks of same color and strength of concrete that is being placed around them.

D. Concrete supports: for reinforcing concrete placed on grade.

E. Conform to requirements of "Placing Reinforcing Bars" published by CRSI.

PART 3 - EXECUTION

3.1 REINFORCING STEEL

A. Clean metal reinforcement of loose mill scale, oil, earth and other contaminants.

B. Straightening and rebending reinforcing steel:
   1. Do not straighten or rebend metal reinforcement.
   2. Where construction access through reinforcing is a problem, use bundle or space bars instead of bending.
   3. Submit details and obtain Engineer's review prior to placing.

C. Protection, spacing, and positioning of reinforcing steel: Conform to the current edition of the ACI Standard Building Code Requirements for Reinforced Concrete (ACI 318), reviewed placing drawings and design drawings.

D. Location Tolerance: Conform to the current edition of "Placing Reinforcing Bars" published by Concrete Reinforcing Steel Institute and to the Details and Notes on the Drawings.

E. Splicing:
   1. Conform to Drawings and current edition of ACI Code 318.
   2. Stagger splices in adjacent bars.

F. Tying deformed reinforcing bars: Conform to current edition of "Placing Reinforcing Bars" published by Concrete Reinforcing Steel Institute and to details and notes on Drawings.

G. Field Bending:
   1. Field bending of reinforcing steel bars is not permitted when rebending will later be required to straighten bars.
   2. Consult with Engineer prior to pouring if there is a need to work out a solution to prevent field bending.

3.2 REINFORCEMENT AROUND OPENINGS

A. Place an equivalent area of steel around pipe or opening and extend on each side sufficiently to develop bond in each bar.

B. See Drawings for bar extension length each side of opening.

C. Where welded wire fabric is used, provide extra reinforcement using fabric or deformed bars.

3.3 WELDING REINFORCEMENT

A. Welding shall not be permitted unless Contractor submits detailed Shop Drawings, qualifications, and radiographic nondestructive testing procedures for review by Engineer.
   1. Obtain results of this review prior to proceeding.
   2. Basis for submittals: Structural Welding Code, Reinforcing Steel, AWS D1.4-79, published by American Welding Society, and applicable portions of ACI 318, current edition.
   3. Test 10 percent of welds using radiographic, nondestructive testing procedures in accordance to the above referenced codes.

3.4 PLACING WELDED WIRE FABRIC

A. Conform to ACI 318-77 and to current Manual of Standard Practice, Welded Wire Fabric, by Wire Reinforcement Institute regarding placement, bends, laps, and other requirements.

B. Placing:
   1. Extend fabric to within 2 inches of edges of slab.
   2. Lap splices at least 1-1/2 courses of fabric and a minimum of 6 inches.
   3. Tie laps and splices securely at ends and at least every 24 inches with 16-gage black annealed steel wire.
   4. Place welded wire fabric at the proper distance above bottom of slab.

END OF SECTION

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SECTION 03 30 00

CAST IN PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide cast-in-place concrete as shown and specified. The work includes:
   1. Formwork.
   2. Reinforcing and accessories.
   3. Cast-in-place concrete foundations,

1.2 QUALITY ASSURANCE

A. Testing and inspection: Performed by a qualified independent testing laboratory.
B. Provide and pay for testing and inspection during concrete operations. Laboratory shall be acceptable to the Owner.
C. Materials and methods of construction shall comply with the following standards:

   1. American Society for Testing and Materials, (ASTM).
   2. American Concrete Institute, (ACI).

D. Maintain field records of time, date of placing, curing, and removal of forms of concrete in each portion of work.

1.3 SUBMITTALS

A. Submit concrete mix designs. Obtain approval before placing concrete.
B. Product data:

   1. Submit complete materials list of items proposed for the work. Identify materials source.
   2. Submit admixture and accessory item product data.
   3. Submit material certificates for aggregates and reinforcing.

C. Submit reinforcement shop drawings. Details shall comply with ACI 315 Manual of Standard Practice for Detailing Reinforced Concrete Structures. Indicate bar sizes, spacing, locations, and quantities of reinforcing steel, bending and cutting schedules, and supporting devices.

D. Submit concrete delivery tickets. Show the following:

   1. Batch number.
   2. Mix by class or sack content with maximum size aggregate.

3. Admixtures.
4. Air content.
5. Slump.
6. Time of loading.

E. Submit concrete test reports.

1.4 PROJECT CONDITIONS

A. Work notification: Notify Landscape Architect at least 24 hours prior to installation of concrete.
B. Establish and maintain required lines, surfaces, and elevations.
C. Do not install concrete work over wet, saturated, muddy, or frozen subgrade.
D. Do not install concrete when air temperature is below 40 degrees F. Use of calcium chloride, salt, or any other admixture to prevent concrete from freezing is prohibited.
E. Protect adjacent work.
F. Provide temporary barricades and warning lights as required for protection of project work and public safety.

PART 2 - PRODUCT

2.1 MATERIALS

A. Portland cement: ASTM C150, Type 1, natural color.
B. Aggregate: Provide AASHTO M43 Grading #57 clean, uncoated crushed stone or gravel coarse aggregate free of materials which cause staining or rust spots; fine aggregate shall be clean natural sand.
C. Water: Clean, fresh, and potable.
D. Air-entraining admixture: ASTM C260.
E. Water reducing admixture: ASTM C494.

2.2 MIXES

A. Provide ASTM C94 ready-mixed concrete. Batch mixing at site not acceptable.
1. Strength: 4,000 psi minimum at 28 days.
2. Slump range: 2" to 4" maximum for consolidation by vibration.

B. Provide an approved water reducing admixture in all concrete.
C. Provide an air entraining admixture in all concrete. Air content 5% to 7%.
D. Indicate water added to mix at job site on each delivery ticket. Show quantity of water added. Site water tempered mixes exceeding specified slump range will be rejected as not complying with specification requirements.

2.3 ACCESSORIES

A. Forms: Wood, plywood, or metal of sufficient strength to resist concrete placement

pressure and to maintain horizontal and vertical alignment during concrete placement. Provide forms straight, free of defects, and distortion. Minimize joints by using largest practical sizes.

1. Plywood: Provide high density overlaid/sheathing grade plywood sound one face, undamaged, with clean true edges where plywood form finish is scheduled.
2. Provide exposed edges chamfered.
3. Provide form ties, form work accessories, and anchorages of size required and of sufficient strength to maintain form work in proper alignment and tolerances while placing concrete.

B. Tubular column and support forms: Round, laminated paper or fiber plies, spirally wound. Inside surface treated with form release agent. Provide wall thickness adequate to resist concrete loads.

C. Form release agent: Nonstaining chemical form release agent free of oils, waxes, and other materials harmful to concrete.

D. Reinforcing bars: ASTM A615, A616, or A617, Grade 60, new domestic deformed steel bars, sizes indicated.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine subgrades and installation conditions. Do not start concrete work until unsatisfactory conditions are corrected.

B. Place no concrete in footings before inspection and acceptance of bearing surfaces.

3.2 PREPARATION

A. Verify lines, levels, and locations of formed concrete work. Verify that form dimensions comply with drawing dimensions.

B. Design, erect, support, brace and maintain form work to support all applied vertical and lateral loads. Construct form work to provide correct size, shape, alignment, elevation, and position of concrete work.

C. Design and erect form work to permit removal without damage to cast-in-place concrete surfaces and adjacent materials during stripping.

D. Earth cuts may be used as foundation forms, when excavations are straight and true, not exposed in the finished structure and acceptable to the Owner. Any indication of excessive slope or failure of earth cuts will require side form work. Hand trim sides and bottoms of earth cuts and remove loose dirt before placing concrete.

E. Precast units to be formed at a convenient location for ease of installation.

F. Install, align, and level forms. Support and brace forms in place. Maintain following maximum tolerances:

1. Horizontal and vertical lines: 1/4" in 10' - 0".
2. Location dimensions indicated: 1/4".

3. Cross sectional dimensions: Plus or minus 1/4".

G. Coat form surfaces in contact with concrete with form release agent. Clean forms after each use and coat with form release agent as necessary to assure separation from concrete without damage. Apply before to placing reinforcing steel, anchoring devices, and embedded items.
H. Locate, place, and support reinforcement as indicated.
1. Provide reinforcing bars adequately supported and secured to prevent displacement.
J. Install, set, and build in items furnished by other trades. Provide adequate notification for installation of necessary items.

3.3 INSTALLATION

A. Concrete placement: Comply with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete", and as specified.
B. Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placing, and curing. In cold weather comply with ACI 306, "Recommended Practice for Cold Weather Concreting". In hot weather comply with ACI 305, "Recommended Practice for Hot Weather Concreting".
C. Place concrete continuously between construction joints. Deposit in horizontal layers not greater than 24". Consolidate layers while still plastic to prevent cold joints.
D. Place all footings full thickness in one operation, without change in proportions; screeded to proper elevation; and floated.
E. Consolidate installed concrete using mechanical vibrating equipment supplemented with hand rodding and tamping. Work concrete thoroughly around reinforcement and other embedded items and into all parts of form work.
F. Formed finishes: Comply with ACI 301.
G. Curing: Moist cure formed concrete surface with forms in place for 7 days. If forms are removed prior to 7 days, apply liquid membrane forming curing compound complying with ASTM C309.
H. Surface repair:

1. Patch and repair defective areas to match adjacent surfaces. Materials and finishes shall be consistent with installed work.
2. Provide sample repair patches, in locations acceptable to the Owner for approval of materials, procedures, and finish results.

J. Acceptance: The presence of serious honeycomb or excessive misalignment of forms shall be sufficient cause for rejection and replacement of the concrete affected at the Contractor's expense.

3.4 FIELD QUALITY CONTROL

A. Provide field quality control testing and inspection during concrete operations.
B. Contractor shall provide adequate notice, cooperate with, provide access to work, obtain samples, and assist test agency and their representatives in execution of their function.
C. Testing:

1. Provide slump test on first load of concrete delivered each day and whenever requested due to changes in consistency or appearance of concrete.
2. Provide air indicator tests and air meter tests for all air entrained concrete.

    a. Perform air indicator test with a "Chase" AE35 or equal air indicator, and air meter test in accordance with ASTM C231 or C173. Test first load of concrete delivered each day.
    b. Furnish copies of field records and tests reports as listed for strength tests.
3. Strength testing:
    a. Provide 1 set of 3 test specimens for each 50 cu. yds. placed in any one day. Secure samples in accordance with ASTM C172 and mold specimens in accordance with ASTM C31.

    b. Test 1 specimen at 7 days and 2 specimens at 28 days in accordance with ASTM C39.
    c. Furnish copies of field records and test reports as follows:
        2 copies to Landscape Architect
        1 copy to Contractor
        1 copy to Ready Mix Supplies
4. Record the exact location of the concrete in the work represented by each set of cylinders and show on test reports.
5. Provide an insulated moist box for protection of the test cylinders until shipped to the laboratory.

3.5 PROTECTION

A. Protect concrete work from damage until final acceptance.

3.6 CLEANING

A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, debris, and equipment. Repair damage resulting from concrete operations.

END OF SECTION

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SECTION 03 48 21

PRECAST CONCRETE BURIAL CRYPTS
(Double Depth Lawn Crypt)

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work covered by this Section includes fabrication, handling, delivery to the site, storage and installation of precast concrete burial crypts; hereafter referred to as units or crypts, subbase foundation and drainage, placement of the units, backfilling, grading, fine grading and turf establishment, and other, all as shown on the plans or specified herein. In addition contractor to provide:

1. American Three (3) crypt lid lifting apparatus.
2. Four (4) extra concrete crypt lids.
3. A device to easily retrieve and lower the inside shelf without entering the crypt.

B. The design of the units shall be as described in this Section and their installation layout shall be as illustrated on the plans. All perimeter crypts shall be structurally designed for overhead and lateral soil pressure plus live loads specified hereafter. All designs will require that the manufacturer provide fabrication drawings stamped by a Professional Engineer indicating that the design meets or exceeds the structural requirements contained herein. The Contractor may propose alternative designs of the corresponding components if all the following requirements are met.

1. Any proposed alternative design shall comply with the design criteria and the functional tests of this specification.
2. Any proposed alternative design shall comply with the design criteria and the functional tests of this specification.
3. The Government may accept or reject part or all of any proposed alternative design. The Contractor will pay for all cost for alternate designs, submittals, and reviews.

1.2 RELATED WORK

A. Excavation and Backfill: Section 31 20 00 EARTHWORK.
B. Materials Testing and Inspection during Fabrication and Construction: Section 01 40 00, TESTING LABORATORY SERVICES.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications: With submittal of bid documents, Contractor shall submit documentation regarding the manufacture of the units. Contractor shall provide evidence that the manufacturer plant(s) used are certified by the National Precast

Concrete Association (NPCA).

B. Precast concrete manufacturer shall provide a licensed Structural Engineer to certify that the units conform to specified requirements.

C. Installation Qualifications: Regularly engaged for at least three years in installation of pre-cast concrete similar to this project.

D. Fabricate crypts to the interior dimensions described below. Replace or repair units that do not comply with the individual dimensions and tolerances.

E. Prior to or in the initial stage of crypt production, furnish at the site two perimeter crypts, a single interior crypt, and the proposed shelf removal tool to demonstrate quality of construction of crypts and conduct on-site buried crypt load testing to include removal and replacement of the inside shelf. Commence production of crypts only after submittal approval and on-site load testing has been scheduled for witnessing by the NCA Crypt Specialist.

F. Design Criteria (Double Depth Crypt):

1. The units shall be of the following type, style, and size:

a. Type: Precast concrete.

b. Style: One-piece box with separate outer lid, and a removable one-piece inside shelf.

c. Crypt interior size: Interior minimum dimensions are as follows:
30” minimum width at the inside bottom floor and for the full height of the crypt; 86” minimum length along the inside bottom floor and for the full height of the crypt; 25” minimum clear height from the highest part of the inside shelf to the underside of the lid and; 25” minimum clear height from the lowest part of the inside shelf to the top of the casket risers and; 3/4” minimum height casket risers from the crypt floor spaced 20” from crypt centerline to eliminate pinching of the lowering straps during removal. Four risers required.

d. Crypt height and wall thickness: Exterior maximum height dimension: 60" including the lid. Crypt wall thickness: 2-inches plus or minus ½ inch. Perimeter crypts may exceed wall thickness dimension. Crypt wall sections at support slots for the inside shelf may be of lesser thickness.

e. Layout: Crypts shall fit in a 3-foot by 8-foot plot or a lesser plot size as noted on the plans. The lesser plot size shall govern. If the contractor’s layout or crypt size dimensions differ, the Contractor at no cost to the Owner shall submit a Layout/Size Plan for approval by the Resident Engineer.

2. Units shall be designed for a burial depth with soil cover as indicated on the plans, and be capable of structurally withstanding a center point load of 6,000 lbs prior to burial, passage of a wheel axle load of 12,000 lbs after burial, and a 3-foot tall pile of excavated material on top of or adjacent to buried crypts.

3. The Contractor shall submit to the NCA inspector for approval five sets of design documentation showing structural design of the units. Contractor to provide one set to NCA Crypt Specialist. This documentation shall include dimensions, methods of construction, and calculations. All design calculations and drawings shall be signed and sealed by qualified licensed Structural Engineer.

4. The concrete lid shall be designed to be removable and replaceable. Lid lifting shall be from top positioned galvanized anchors (4- required per lid) with a

removable anchor covers to prevent dirt from entering the anchor bowl as specified in Sec 2.2 and installed in such a manner as not to be hit by excavating equipment when scraping backfill off the top of the lid. The Contractor shall furnish the cemetery with three (3) OSHA approved and tag certified wire rope lifting devices for removing the lid. No chain lifting devices allowed.

5. Inside shelf will be one piece rigid construction, fully conceal the lower casket with a rigid barrier, weigh 40 lbs. or less, allow for easy casket lowering belt removal, and capable of holding 400 lbs indefinitely. The entire inside shelf should be rigid, non-brittle, non-deteriorating, and have a ½ inch gap from all shelf edges to the crypt wall. Provide tools that Owner can easily retrieve and install the shelf from ground level without entering the crypt and demonstrate said tool at the crypt buried load testing.
6. The concrete lid shall be beveled along the entire top perimeter. Chamfer top edge of lid with a 1:1 chamfer beginning ½ inch down from top.
7. The design of casket risers shall allow the casket to rest ¾ inch above the inside floor of the crypt and above the top of the inside shelf in order to aid in casket lowering straps removal. In addition, rests location shall not exceed 21 inches from crypt centerline.
8. There shall be a minimum of two 1" diameter drain holes in the bottom at opposite ends of each crypt to allow for complete water drainage.
9. The crypt outside lifting wire shall be designed for transport and installation along with provisions for removal/abandonment of crypt lifting wire once crypt has been installed.

G. Design Criteria (Quad Crypt):

1. An alternate concrete Quad unit (one piece) may be used as an approved equal in lieu of two (2) double depth lawn crypt units. The Quad units shall conform to all other specified herein including:
   a. The shared interior wall thickness may be increased to allow for a gap between lids as deemed appropriate to meet layout requirements.

B. Functional Load Test: A functional on-site load test will be made at the Contractor's expense to insure the units are capable of supporting loads stated. The functional test will consist of following loading conditions:

1. Confined Loading: An interior unit between two perimeter units shall be placed in a hole dug in the ground on site and covered with 24 inches of soil or covered to the maximum depth as shown on the plans, which ever is greater. The soil will be compacted to density along the sides (usually 95%) and reduced density over the lid, both as shown on the plans. An axle load of 12,000 lbs. will then be passed over the covered crypts for a minimum of 10 times in repetition, in a manner that causes maximum lateral pressure due to wheel load on the sides of the crypts. The crypts shall then be fully excavated, exposed and the lids removed to allow careful examination inside and outside. The crypts must not show any signs of stress or cracking.
2. Concurrent with Confined Loading, the inside shelve of the interior crypt shall be loaded with one worker with a minimum weight of 200 lbs. Worker shall walk on individual supports to confirm structural integrity and load bearing capability.

Worker shall adhere to all safety regulations while performing test. Upon uncovering and load removal, the shelf shall be removed by the proposed removal tool and the shelf must not show any signs of stress, cracking or deflection.

1.4 ALLOWABLE TOLERANCES

A. Tolerances of individual units shall be as follows:
   1. Variation in overall crypt outside dimensions of unit (height, length and width): 1/8" plus or minus. There is zero tolerance for any lesser crypt inside minimum clear dimensions.
   2. Variation in thickness of precast panels and elements: 1/16" plus or minus.
   3. Maximum height differential in final placement in the ground: 1/4" above or below design grade.
   4. Cracks greater than 0.030 inches in width are cause for crypt rejection by the NCA inspector. With evidence of fiber or steel reinforcement, any cracking 0.030 or lesser width that does not extend thru wall is acceptable. Any cracking 0.016 inch or lesser that extends thru wall is acceptable. All other cracks are cause for rejecting crypts that shall be repaired or removed and replaced at no cost to VA.

1.5 SUBMITTALS

A. In accordance with Section 01 33 00, Submittal Procedures, within 45 days of the approval of the shop drawings, Contractor shall furnish to the Owner and the NCA Crypt Specialist the following:
   1. Samples: deliver to the site for testing and inspection:
      a. Two perimeter crypts and one interior crypt.

B. Submit a detailed concrete Mix Design of Self Consolidate Concrete (SCC) with a 15% minimum requirement of a cement substitute of fly ash and/or other pozzalons.

C. Submit Shop Drawings:
   1. Erection Narrative:
      a. Method of transportation
      b. Method of handling and placement
   2. Production Drawings:
      a. Elevation view of each unit.
      b. Plan view of unit.
      c. Sections and details to show quantities, sizes and position of reinforcing steel, inserts, and essential embedded hardware for fabrication, handling, transportation and installation.
      d. Section, details and location of specialty lid lifting anchors, caps, and lid lifting system.
      d. Dimensions and finishes.

D. Submit Product Design Data:
   1. Structural adequacy calculations of units (crypts), performed by a licensed Structural Engineer.
   2. Loadings for Design Calculations:
      a. Initial handling and erection stresses.

b. Dead and live loads specified.
c. Other loads specified for units as applicable.
d. Deflection of precast members.
e. Product test reports:

1) The concrete shall be tested for the compressive strength and beam flexural strength as specified herein. An approved independent, commercial testing laboratory shall perform tests. Certified copies of test reports, including test data and results shall be submitted to the Resident Engineer (NCA inspector) immediately after the strength tests have been completed. The tests shall be as specified herein.

2) Prior to backfilling over crypts and at contractor expense, the NCA inspector may pick a single crypt for coring another bottom slab drainage hole by an independent lab with said core being analyzed (petrography testing) and results submitted verifying evidence of fly ash or other pozzalons as specified.

3) Based on failed testing, the NCA inspector may request more frequent testing to ensure quality of the product and pozzalons content is present, again at contractor expense.

3. Manufacturer's Literature and Data:
   a. Each type of anchorage, angle, and fastener.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery and Handling: Units shall be transported, stored and handled so as to prevent damage to surfaces, edges and corners and to prevent development of stresses and cracks. The Contractor shall provide temporary bracing protection devices and measures as necessary to prevent damage to the units during handling, transportation and storage. Contractor is responsible for transportation, storage and handling of units such that any negligence on the Contractor's part shall be corrected at the Contractor's expense.Use the designed crypt lifting wire to transport crypts. On the job site, forklift handling of crypts may be approved by the VA upon demonstration that no crypt damage will be incurred.

B. Storage:
   1. Units may be stored at designated locations(s) on site.
   2. Variation in thickness of precast panels and elements: 1/16" plus or minus.
   3. Maximum height differential in final placement in the ground: 1/4" above or below design grade.
   4. Cracks greater than 0.030 inches in width are cause for crypt rejection by the NCA inspector. With evidence of fiber or steel reinforcement, any cracking 0.030 or lesser width that does not extend thru wall is acceptable.Any cracking 0.016 inch or lesser that extends thru wall is acceptable. All other cracks are cause for rejecting crytps that shall be repaired or removed and replaced at no cost to VA.

C. Markings and Identifications:
   1. Markings, including logos, trademarks and proprietary information are prohibited on

surfaces of crypts.

2. Date of manufacture (month, day, year) shall be written on the box and lid with permanent ink or an equivalent marking.

1.7 COORDINATION

A. Coordinate the manufacture, delivery, storage and installation of the units with related work.

1.8 GUARANTEE

A. After erection, completed work will be, subject to terms of Article, GUARANTEE in Section 01 00 00, GENERAL CONDITIONS, except guarantee period is extended to five years.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Precast Concrete: All crypts shall be of concrete with a minimum 28 days compressive strength of 5,000 psi, be Self Consolidated Concrete (SCC) containing structural fiber with an inverted slump between 22" and 28"; and shall contain a minimum of 15% cement substitute of fly ash and/or other pozzalons. Fiber is not required for crypt lids. All to be in conformance to the following requirements:

1. Hydraulic Cement: ASTM C150 or ASTM C1157 or ASTM C595
2. Normalweight Aggregates: ASTM C 33
3. Water: ASTM C1602
4. Chemical Admixtures:
   a. Water reducers, accelerating and retarding: ASTM C 494 b. Air Entraining: ASTM C260
   b. Admixtures for flowing concrete: ASTM C1017.
   c. Admixtures with no standard designation shall be used only with approval of VA.
5. Prohibited Admixtures: Calcium Chloride thyocyanates or admixtures containing more than 0.1 percent chloride ions.

B. Reinforcement :

1. Welded Steel Wire Fabric: ASTM A185.
2. Steel Wire Reinforcement: ASTM A82, cold drawn.
3. Steel Reinforcement: ASTM A615 Grade 60, deformed.
4. Inserts, Anchors, Dowels and Accessories: Steel, ASTM A36, zinc coated ASTM A153 hot-dipped galvanized finish G90.
5. Fiber: Macrofiber complying with ASTM C1116

C. Form Coatings:

1. Use commercial formulation form-coating compounds that will not bond with, stain, or adversely affect concrete surfaces.

C. Paint:

1. Use commercial Concrete & Garage Floor Epoxy Acrylic Paint for crypt concrete lid & inside wall surface numbering. Paint as manufactured by BEHR Deep Base #930 or approved equal.

2.2 FABRICATION

A. General:

1. Units shall be fabricated in accordance with the minimum interior dimensions and tolerances indicated herein, with concrete surfaces that are smooth and free of irregularities.

B. Finishes:

1. Surface holes (1/4" and smaller) caused by air bubbles, normal color variations, normal form joint marks, small chips (1/4" and smaller) and spalling (no more than one square foot total per unit) are permitted.
2. Exposed steel reinforcing, honeycomb, bugholes, and cracks not within tolerances are not permitted.
3. The lid lifting system shall be top mounted and consist of hot dip galvanized steel anchors (four per lid) each in a 2-1/2" diameter minimum recessed bowl of depth sufficient to easily connect lifting device as designated compatible by anchor manufacturer. Anchors to be installed at locations to ensure maximum lid lifting stability. A removable plastic cap secured to the anchor will prevent fill material from entering the anchor bowl. Cap to be flush mounted to ensure the entire assembly is not an obstruction for crypt excavating equipment.
4. Concrete shall have no evidence of segregation of materials.

C. Reinforcement:

1. Provide steel and fiber reinforcing as required for casting, handling, erection loads, lateral and overhead fill, and equipment live loads.
2. Reinforcing steel shall be free of dirt, mill scale, rust, oil, grease, ice, snow, water and placed within approved tolerances in accordance with ACI 318. Careful placement of reinforcing is required to avoid overlapping at thin points of the units.

D. Concrete Placement:

1. Porosity, strength, weight and gradation of coarse aggregate shall be as required to produce specified characteristics.
2. Units shall be cast in steel forms designed to suit shape and finish required. Each element of the unit shall be cast as an integral piece free of joints and seams.

E. Curing:

1. 90% of specified concrete compressive strength shall be attained before transportation of units to the cemetery or storage site.
2. Units shall be cured as required to develop specified structural characteristics and shall be stored in a manner that will permit all surfaces to cure equally.
3. Units shall be properly cured in accordance with the applicable provisions of the current ACI Manual of Concrete Practice.

F. Surface Treatment and Corrective Work:
   1. Units that have minor chipping of edges and corners shall be repaired by a method approved by the NCA inspector.
   2. Cracked/damaged units exceeding tolerances shall be removed by the contractor at no cost to the government.

2.3 TESTING AND INSPECTION

A. Contractor's Responsibility for Inspection:
The Contractor is responsible for the performance of all inspection requirements including the removal of lids, number painting inside crypts, and replacement of the lids for inspection by the Resident Engineer.The NCA inspector reserves the right to perform any of the inspections set forth in the specification when deemed necessary to assure that the units conform to prescribed requirements.

PART 3 - EXECUTION

3.1 CRYPT FIELD QUALITY ASSURANCE

A. Testing: The contractor shall procure an independent qualified testing agency to perform concrete tests during crypt production and prepare test reports.
   1. Concrete Cylinder testing for compressive strength: Three cylinders per day of crypt production to be taken in accordance to ASTM C172 as applicable to SCC. Strength to exceed 5000 psi after 28 days curing in accordance to ASTM C31 & C39. Test inverted slump when cylinders are made.
   2. Beam testing to confirm design flexure strength: Once at the beginning of crypt production, a minimum of three beams with fiber shall be taken for testing of Flexural Performance of Fiber- Reinforced Concrete in accordance with ASTM C78 and C1399. All beams' flexural strength shall exceed the crypt design flexural strength requirements and residual strength of fiber reinforced concrete, and shall exceed capacity of conventionally reinforced concrete wall design as submitted by the Structural Engineer and approved by VA. Fiber Manufacturer shall verify type and dosage rate of the test beams are identical in crypt production.
   3. A single verification test of fly ash in the crypt concrete mix required at the discretion of the NCA inspector.

3.2 GENERAL LAYOUT CONTROL

A. A professional registered Land Surveyor shall establish and control horizontal and vertical alignment of units.

3.3 PREPARATION

A. Before beginning installation, inspect work of other trades insofar as it affects the work of this section. Commencing installation of units will be construed as accepting as suitable the work of other trades.

1. Verify by survey, grading of subgrade and aggregate base for proper installation of units.
2. Verify by testing, compaction of prepared subgrade and subbase.
3. Verify by survey locations and elevations of units relative to control points indicated on plans. Submit new control point layout if a crypt size other than specified is used.

3.4 HANDLING, INSTALLATION AND PAINTING

A. Handling:
1. Units shall be handled in a vertical plane at all times and stacked vertically on wood supports of adequate strength, until erected. On the job site, use the designed lifting cable to transport crypts from the truck to storage to the final installation.
2. Lift units with suitable lifting devices at points provided by manufacturer.
3. Provide temporary wood bracing to comply with manufacturer's recommendations to keep crypt bottom off ground during storage.

B. Installation:
1. Install units by competent erector crews trained and certified as competent by manufacturer.
2. Use all means necessary to protect units from being damaged in transport and during and after installation. Lids that show damage from bouncing during transport shall be replaced by the contractor at no cost to the Owner.
3. Accurately install by aligning and leveling units in accordance with plans. Assure that crypts are in straight horizontal alignment.
4. After crypt installation and prior to backfill, the contractor shall remove lids with the specified lifting apparatus for crypt inspection by the NCA inspector and numbering. Numbers furnished by NCA shall be painted by the contractor on the outside of the crypt lids and on the upper inside crypt short wall, both at the headstone end. Numbers shall be permanent paint as specified and twelve inches high. Crypt lid number painting must be applied to a clean, dust-free surface requiring paint application within 10 seconds of surface cleaning. After completion of inspection and marking, the Contractor shall replace the lids. Any damage to lids or crypts will be the responsibility of the contractor.

3.5 PROTECTION OF WORK

A. Use all means necessary to protect units from being damaged during and after installation..

3.6 REPLACEMENT AND REPAIR

A. Remove and replace units that the Resident Engineer has determined are damaged, cracked beyond tolerances, broken, improperly fabricated, or otherwise defective and are structurally unsound and unacceptable.

B. Units having minor defects not affecting serviceability or appearance may be repaired when approved by Resident Engineer.

C. Repair work shall be sound, permanent, and flush with adjacent surfaces. D. Replacements and repairs shall be done at no additional cost to the State.

3.7 BACKFILLING AND CRYPT FIELD PROTECTION

A. Protect installed crypt units during backfill operations.

B. Install approved backfill against outside walls of all units, insuring no voids are remaining. Approved backfill shall contain no material that will cause a concentrated point load. The perimeter wall backfill shall be compacted to 95% density to the level equal to the top of the crypts.

C. Install an approved pea gravel (rounded) fill per gradation into gaps between crypts leaving no voids. Use rodding to assure no bridging occurs and void areas are eliminated. No sand allowed. At NCA's discretion, a cut aggregate substitute of same gradation may be approved with demonstration that filling gaps between crypts leaves no voids.

Aggregate Size No	Grading Requirements - Amounts finer than Each Sieve (Square Openings), Mass Percent					
	1/2"	3/8"	No. 4	No. 8	No. 16	No. 50
8	100	85 to 100	10 to 30	0 to 10	0 to 5	
89	100	90 to 100	20 to 55	5 to 30	0 to 10	0 to 5

D. Install backfill on top of units and compact. Backfill shall be as shown on plans. In absence of plan detail, backfill on top of units working from bottom up consists of 2 inches of identification sand, soil to specified level, and 4 inches of topsoil as the final layer. The entire backfill atop units shall be compacted to 85% standard proctor density.

E. No equipment over the crypts should exceed crypt design loads as specified herein (12,000 lbs axle), which includes compacting equipment. No vibratory compaction equipment over or along side crypts unless impact loads are shown not to exceed crypt design loads.

F. Immediately during crypts install, contractor to mark the crypt field edges with temporary driven 5-foot tall lathes & signage for easy identification by vehicles carrying fill, topsoil, compost, sod, water or other. Signage shall state "12,000-lb axle load maximum. Keep 10 yards away" Lathes & signage to be maintained in-place during backfilling thru final acceptance of the crypt field.

G. Finish grading and prepare topsoil as indicated on plans.

H. The contractor shall not store or stockpile any stone, sand, backfill or any other material over 4-feet high within ten (10) yards of or on top of installed crypts. Affected crypts subject

to said loading condition as determined by the RE shall be inspected by the RE for possible damages with all excavation, lid lifting, fill replacement and all other work as necessary, all at contractor's expense.

I. The contractor shall not allow any vehicle that exceeds a 12,000-lb axle load, 6000-lb wheel load or equivalent pressure per square inch to traverse or park within ten (10) yards of or on top of installed crypts. Affected crypts subject to said loading condition as determined by the RE shall be inspected by the RE for possible damages with all excavation, lid lifting, fill replacement and all other work as necessary, all at contractor's expense.

3.8 INSPECTION AND ACCEPTANCE

A. Final inspection and acceptance will be by NCA inspector.

END OF SECTION

SECTION 23 00 10 - MECHANICAL GENERAL

PART 1 - GENERAL

1.01. CONTRACT DOCUMENTS

A. Drawings are diagrammatic, due to scale, and indicate the general arrangements and geometric relationships of equipment, systems, and services. They are not intended to show or indicate every offset, sequence, device, option, fitting, valve, or accessory. Plan work around building details and other crafts. Do not scale drawings for exact sizes and locations.

B. Contractor shall base all his measurements, both horizontal and vertical, from established benchmarks. All work shall agree with these established lines and levels. Contractor shall verify all measurements at site and check correctness as related to the work.

C. In case of interferences between trades, Engineer will decide which work is to take precedence regardless of work that might be installed.

1.02. CODES, ORDINANCES, INSPECTIONS AND PERMITS

A. Work is to be executed and inspected in accordance with local and State codes, laws, ordinances, rules and regulations applicable to particular class of work, including the State Mechanical Code, State Plumbing Code, State Gas Code, and State Fire Code. Associated fees shall be paid by the Contractor.

B. Should any part of drawings or specifications be found to be in conflict with applicable codes or ordinances, notify the Engineer, in writing, within 72 hours prior to bid deadline for review and/or correction of bid documents. After project bidding is closed, any discovery of code violations shall be promptly reported to the Engineer. Any work performed in violation of applicable codes or ordinances shall be corrected without additional expense to the Owner or his representatives.

C. Pressure and heating vessels, including hot water storage containers, shall be constructed in compliance with the rules and regulations of the Boiler Inspection Division of the State. All installations of such equipment shall be made by a firm licensed and approved by the Boiler Inspection Division of the State.

D. Facilities shall be installed in compliance with the requirements of the current version of the Americans with Disabilities Act (ADA). Installation of mechanical and plumbing systems including fixtures and control mounting heights, clear knee space, and access clearances shall comply with ADA required dimensions, and as shown on details or schedules when shown.

E. Contractor shall arrange with County, City or State, if City has no ordinances covering work, for complete inspection, paying all charges required. Give proper

authority requisite notice relating the work; afford Engineer and authorized inspectors adequate access to the Work for inspection; and be responsible for all violations of law. Upon completion of work, have work inspected, if required, obtaining certificates of inspection and approval from inspecting agency and deliver certificates to Engineer and Owner.

1.03. REVIEW OF CONTRACT DOCUMENTS AND SITE

A. With the submission of his bid, Contractor shall give written notice to the Engineer of any materials or apparatus believed inadequate or unsuitable, in violation of laws, ordinances, rules or regulations of Authorities having jurisdiction, and any necessary items of work omitted. In the absence of such written notice, it is mutually agreed that the Contractor has included the cost of all required items in his proposal for a complete project.

B. Contractor shall acknowledge that he has examined the Plans, Specifications, and Site, and that from his own investigation he has satisfied himself as to the nature and location of the work; the general and local conditions, particularly those bearing upon transportation, disposal, handling and storage or materials; availability of labor, water, electric power, roads and uncertainties of weather; the confirmation and condition of the ground; the characters, quality and quantity of subsurface materials to be encountered; the character of equipment and facilities needed preliminary to and during the execution of the Work, especially the prohibited use of Owner's permanent equipment, ductwork, and controls; all federal, state, county, township and municipal laws, ordinances, and regulations particularly those relating to employment of labor, wage rates, and construction methods; and all other matters which can in any way affect the Work or the associated cost of the Work under this Contract. Any failure by the Contractor to acquaint himself with the available information concerning these conditions will not relieve him from the responsibility for estimating properly the difficulty or cost of successfully performing the work.

C. If, during the performance of the work, the Contractor finds a conflict, error or discrepancy between or among one or more of the Sections or between or among one or more Sections and the Drawings, furnish the higher performance requirements. The higher performance requirement shall be considered the equipment, material, device or installation method which represents the most stringent option, the highest quality or the largest quantity.

1.04. USE OF THE OWNER'S EXISITNG AND NEW, PERMANENT HVAC SYSTEM DURING CONSTRUCTION

A. Use of the Owner's existing and currently being installed, permanent HVAC system during Construction is prohibited. Provide temporary means for heating and cooling required by construction activities for curing or drying completed installations or for protecting installed construction from adverse effects of temperature and humidity. Provide temporary dehumidification systems when

required to reduce substrate moisture levels required to accommodate installation or application of finishes.

B. Maintain a minimum ambient temperature of 50 DEG. F. in areas where construction is in progress, unless indicated otherwise in the specifications.

C. Prevent dust, fumes, construction debris, and odors from entering existing and newly installed HVAC equipment, ductwork, and control system components. Prior to commencing work, isolate HVAC equipment. Where existing HVAC systems will be affected, isolate existing supply, return, and exhaust ducts by disconnecting ductwork at point where existing duct shall remain. Cover ends of existing ductwork securely with black plastic material.

D. Newly installed ductwork shall be thoroughly cleaned before installation. Each section that is installed at the end of the day shall have open ends securely covered with black plastic material.

E. Newly installed HVAC equipment shall be securely covered and protected with black plastic material or by other approved method. After installation of air moving equipment, duct connections shall be securely covered with black plastic material. Connections to duct systems shall not be made until final finishes have been installed, areas served are clean, and building is ready for HVAC equipment start-up and use.

F. Securely cover control system components to prevent damage from construction debris, dust, and dirt. Control systems shall not be energized for testing and adjusting until HVAC system start-up.

G. HVAC Equipment, Ductwork, and Control Components contaminated by construction debris, dirt, and construction dust shall not be acceptable and shall be replaced at no additional cost to the Owner. HVAC Equipment, Ductwork, and Control components shall be kept clean throughout construction. Cleaning after an HVAC system has been contaminated shall not be an acceptable alternate to replacement.

1.05. SHOP DRAWINGS AND SUBMITTALS

A. Submit manufacturer's catalog sheets and/or shop drawings covering all phases of work included in this Contract.

B. Arrange submittals in sets and bind in PDF format. Loose sheets are not acceptable. Indicate for each item the location, system, or position where it is to be used, arrange by equipment type and tab sections.

1. Individual submittal packages may be made for plumbing, HVAC, fire protection, test and balance, and controls. The Contractor may submit up to 5 different packages, but where practical provide all submittals in a single PDF.

2. Items which are required to be resubmitted shall come in a single PDF. Approved equipment is not required to be resubmitted.

3. The Contractor is responsible for verification that all items are submitted.

C. Submittals shall bear written certification to the effect that the Contractor has examined them and found them to include all items required to be submitted and to be in accordance with specifications.

D. Submittals are required even though equipment being furnished is exactly as specified.

E. Submittals shall include all data required in individual sections of these specifications.

F. Contractor is responsible for making all submittals required by the specifications for approval. If equipment is delivered or installed without an approved submittal, Contractor may be required to remove and replace equipment with specified and approved equipment, as directed by the Engineer, without additional cost to the project.

G. Exceptions for Submittals

1. Exceptions to the Specifications or Drawings shall be clearly defined in a separate section of each submittal package. The submittal shall contain the reason for the exception, the exact nature of the exception and the proposed substitution so that a proper evaluation may be made by the Engineer. The acceptability of any device or methodology submitted as an "or equal" or "exception" to the Specifications shall be at the sole discretion of the Engineer.

2. By noting the term "compliance", it shall be understood that the Contractor is in full compliance with the item specified and will provide exactly the same with no deviations.

3. By noting the term "deviation", it shall be understood that the Contractor prefers to provide a different component in lieu of the one specified and in so doing, takes full responsibility for making the equipment work as specified and will provide any and all ancillary components to make the equipment work at no extra cost to the Owner.

4. By noting the term "alternate", it shall be understood that the manufacturer proposes to provide the same operating function but prefers to do it in a different manner and in so doing, takes full responsibility for making the equipment work as specified and will provide necessary ancillary components to make the equipment work at no extra cost to the Owner. The alternate method shall be fully described with schematic diagrams and one-line diagrams as applicable.

1.06. SUBSTITUTION OF MATERIALS

A. Final decision as to whether or not a specific piece of equipment meets specifications shall rest with Engineer.

B. Substitution requests will not be accepted prior to bid.

C. Equipment and material manufacturers are referenced in the Plans and Specifications to establish the basis of design and required standards.

D. With each Substitution Request, submit technical data that will fully establish the equality of the proposed substitute product with that listed. Submit completed Substitution Request Form.

E. Substitution Process

1. The naming of a manufacturer's product with the words "basis of design" or the naming of a single manufacturer's product on a drawing equipment schedule, on other drawings, or in the specifications, establishes that specific product as the basis for design. In the absence of any other named acceptable manufacturer's product, provide the "basis of design" product. No substitutions will be accepted.

2. Where other manufacturer's names are listed on the drawings or in the specifications as acceptable in addition to the "basis of design" product, product acceptability for these manufacturers shall be verified via submittal review after the project has bid. No other substitutions will be accepted.

3. Where the words "include but shall not be limited to" or "or equal" are used in addition to a manufacturer's name or a list of manufacturer's names, product acceptability for these manufacturers shall be verified via submittal review after the project has bid.

4. It is the responsibility of the Contractor to provide all of the data necessary to establish acceptability of the product.

5. The submittal for the substitution will be reviewed for conformance with the specifications and equality to the specified products. Full submittals will be required of all equipment. Substitution submittals will be reviewed and shall be rejected if the proposed equipment is found to be different than indicated on the Substitution Request Form, or is found deficient compared to scheduled performance/or specifications.

F. Any proposed substitutions of equipment shall be accompanied by product submittal and shop drawings showing revised equipment layouts, piping diagrams, ductwork drawings and/or wiring diagrams. Where substituted equipment furnished requires use of larger, more, or differently arranged

connections, such connections shall be installed to the complete satisfaction of Engineer without additional cost to Owner.

G. The Contractor is responsible for full coordination of all changes required by substituted equipment, including dimensional clearance.

H. The Contractor is responsible for all additional costs of equipment installation, coordination and engineering which results from his substitution. This includes all aspects of the work including architectural, structural, civil, electrical, and mechanical. This also includes costs for the redesign time of Architects and Engineers.

I. Costs associated with dimensional, performance, or other deviations from the "basis of design" equipment, including engineering costs to evaluate such deviations, shall be paid by the Contractor. If a product other than the "basis of design" product is submitted and subsequently rejected during the submittal process, Contractor shall provide the "basis of design" product.

J. Should a substitution be accepted and subsequently proven unsatisfactory for the service intended within the warranty period, the Contractor shall provide the basis of design, or make corrections as directed by Engineer.

1.07. GUARANTY-WARRANTY

A. Guarantee shall include capacity and integrated performance of component parts of various systems in strict accord with the intent and purpose of these specifications. Conduct such tests as herein specified or as may be required by the Engineer to demonstrate capacity and performance ability of various systems to maintain specified conditions.

B. Compile and assemble the warranties specified in the mechanical division, tabulated and indexed for easy reference.

C. Provide complete warranty information for each item to include product or equipment; date of beginning of warranty or bond; duration of warranty or bond; and names, addresses, telephone numbers, and procedures for filing a claim and obtaining warranty services.

D. All materials and equipment shall carry a full year's warranty from time Owner accepts building or the date of substantial completion, whichever is earlier, regardless of start-up date of equipment, unless a longer warranty period is specified under other sections. Longer warranty periods for specific items shall be listed in other sections of these specifications.

PART 2 MATERIAL

2.01. MATERIAL AND EQUIPMENT

A. Equipment shall be new, undamaged, and of the same manufacturer except where indicated otherwise.

B. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.

C. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage.

D. Protect work and equipment at all times from damage, weather, and entrance of dirt and water. Close pipe and duct openings with caps or plugs during installation.

2.02. ELECTRICAL

A. Contractor shall carefully coordinate voltage and amperage requirements of equipment to be provided. Coordinate with Electrical Contractor prior to equipment order. Any change to electrical systems required by Contractor's substitutions or uncoordinated equipment needs shall be made without cost to the project.

B. Provide all electrical interlock, control, and other wiring, not covered specifically under the electrical drawings and specifications, for proper operation and control of all equipment specified under this Division of the specifications.

C. Supervise and coordinate all electrical work in connection with mechanical systems.

D. Furnish all motor controllers and contactors, not furnished as part of a motor control center, or by Electrical Division for proper operation of all motors. Submit motor data with submittals.

2.03. ROOF AND FLASHINGS

A. A. Special care shall be taken on roofs to prevent damage. Promptly repair any damage at no additional expense to the Owner. Comply with bonding requirements of new and existing roofs.

B. B. Flashings are not covered by this section. Refer to Architectural Division.

2.04. ACCESS PANELS

A. Provide access panels in all floors, walls, and plaster and non-lay-in type ceilings as required or as indicated to service devices in piping requiring access, controls, devices in ductwork requiring access, and other system components requiring access for service or regular maintenance. Closely coordinate requirements for

access doors before bidding.

B. Access doors shall be "Milcor" type appropriate for the construction involved.

C. Size and type shall be as required for proper service and/or as may be directed by the Engineer. Minimum size to be 24” x 24”.

2.05. ASBESTOS AND OTHER HAZARDOUS OR TOXIC MATERIALS

A. No Asbestos containing materials shall be used on this project.

B. Contractor is responsible for his own means and methods of safety where Hazardous or Toxic materials are use for the installation of his work. All work shall comply with state and federal regulations.

C. Contractor shall protect the Owner's facility and employees from conditions generated by his work.

D. In the event that a potentially hazardous material is discovered during the course of the work, Contractor shall stop work immediately, and provide for the safety of his employees and other occupants. He shall make proper notifications as required by his contract and by law.

2.06. CONCRETE

A. Concrete materials and installations indicated on the drawings for curbs, pads, and supports for mechanical equipment shall be provided as part of the contract.

B. Comply with other architectural and structural portions of the specifications for materials and methods.

C. Concrete.

1. Concrete shall be commercial grade containing Portland cement, aggregates, clean water, and mix ratios suitable for the loads, and site conditions.

2. Concrete shall be 3,000 psi class indoors and 3,500 psi class outdoors unless noted otherwise.

3. Comply with ACI standards for cold and hot weather applications.

D. Installation

1. Use rigid and smooth forms to prevent visible defects and deflections in the work. Use form compound to prevent concrete bonding to the forms.

2. Provide chamfered corners on the tops of curbs.

3. Reinforce pads and curbs with steel reinforcing bars minimum size number 3, welded wire fabric, or as indicated on the drawings. Set the reinforcing depth within the concrete for optimum strength for the application.

4. Provide equipment pads of sizes indicated and at least large enough to extend past the mechanical equipment 6" on all sides. Minimum height 6” unless otherwise noted.

5. Pour pads integral with the floor slab, isolate from the floor slab, or dowel the pads, as indicated on the drawings.

6. Grout all voids with high strength grout mixture.

7. Installation of the pads shall be coordinated so that the concrete has set and the strength is suitable for installation of the equipment.

8. Set anchor bolts where indicated by either equipment manufacturer or Structural Engineer.

9. Brush-finish equipment pads.

2.07. LOCAL SITE CONDITIONS

A. Before bidding, make complete investigation at site in order to be informed as to location of utilities and as to conditions under which work is to be performed. Utility locations shown were obtained from surveys and/or local utility companies and are offered as a general guide only and are not to be assured accurate.

B. Make determination of soil conditions before bidding. These specifications and accompanying drawings in no way imply condition of soil to be encountered.

2.08. EXCAVATION, TRENCHING AND BACKFILLING

A. Excavation, trenching, and backfilling in connection with the mechanical system, to a point 5'-0" outside the building, is included as part of this Division, unless indicated otherwise.

B. Excavation required shall be done as part of the contract price regardless of any implied conditions on the drawings or in these specifications.

C. Excavation to have 12" minimum and 24" maximum clearance on all sides. Do not carry excavation below required level unless indicated otherwise on the drawings. Excess excavation below required level shall be backfilled at no expense to Owner with earth, sand, gravel, or concrete, as directed by Engineer and thoroughly compacted. Remove any unstable soil and replace with gravel, crushed stone, or clean sand and thoroughly compact. Engineer will determine the depth of removal of any unstable soil encountered. Grade ground adjacent to

excavation to prevent water from running into excavation. Remove accumulated water in the excavation.

D. Banks of trenches shall be vertical or as shown on the drawings. Width of trench shall be 5" minimum, 8" maximum on each side of pipe bell. Excavate bell holes accurately to size by hand. In rock, excavations shall be carried 8" below bottom of pipe. Use loose earth or gravel for backfill and tamp thoroughly.

E. Bracing, sheathing, and shoring shall be performed as necessary to complete and protect excavations indicated on the drawings, as required for safety, as directed by Engineer, and to conform to governing laws and state and federal regulations. Comply with OSHA Regulations.

F. After piping installation, inspection, testing, and approval by governing agency; backfill trenches with clean, stable soil free from stones. Place backfill in 4" layers, tamped under and around pipe and conduit to height of at least 2' above pipe. Tamping shall be done in such manner as not to disturb underlying work. Remainder of trenches and excavations shall be backfilled with clean, stable earth, deposited in 8" layers and brought up to rough grade, with each layer compacted to density of surrounding soil. Remove sheathing and shoring as backfill is placed and fill space with dry sand. Compaction tests may be required by the Engineer, with the costs paid by the Contractor.

G. Underground piping shall be marked with metallic marking tape inserted in the trench a minimum of 12" below grade and a minimum of 12" above mains.

H. Replace existing appurtenances removed or damaged in connection with work, and restore to original conditions, unless directed otherwise.

2.09. MECHANICAL INSTALLATIONS:

A. Coordinate mechanical equipment and material installation with other building components and other trades. Investigate each space in the structure through which mechanical equipment furnished under these specifications must pass to reach its final location. Coordinate shipping splits with the manufacturer to permit safe handling and passage through restricted areas in the structure.

B. Verify all dimensions by field measurements. By ordering equipment, Contractor assumes responsibility for the installation and orientation of equipment in the available space.

C. Arrange for chases, slots, and openings in other building components to allow for mechanical installations.

D. Coordinate the installation of required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.

E. Sequence, coordinate, and integrate installations of mechanical materials and

equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing-in the building.

F. Fit equipment, pipe, and duct into the available spaces in the building and introduce into the building, at a time, and in a manner, as not to damage the structure. Install ductwork and piping to provide the maximum possible clear height underneath.

G. Coordinate the cutting and patching of building components to accommodate the installation of mechanical equipment and materials.

H. Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide the maximum headroom possible.

I. Install mechanical equipment to facilitate maintenance and repair or replacement of equipment components. Connect equipment for ease of disconnecting, with minimum of interference with other installations.

J. Coordinate the installation of mechanical materials and equipment above ceilings with suspension systems, light fixtures, and other installations.

K. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

L. Do not support material or equipment of other trades from piping or ductwork.

M. Do not use equipment, piping, or ductwork as scaffolding, scaffolding support, or as other means to access the work. Damaged systems and components shall be repaired or replaced in accordance with the full satisfaction of the Owner and Engineer.

N. Core drill piping penetrations of concrete walls, floors, and other concrete structures.

O. Equipment locations shown on the drawings are approximate. Final locations shall be established and determined in the field to best utilize available space.

P. Replace architectural features removed or damaged during the course of the work.

Q. Maintain fire assembly ratings as dictated by authorities having jurisdiction. Seal around penetrations through UL rated assemblies, fire, and smoke walls.

R. Fully seal around duct or pipe routed through exterior walls.

2.10. EQUIPMENT CONNECTIONS

A. Each equipment item with drain connections shall be provided with a properly-sized drain run to the nearest floor drain or as directed.

B. Rough-in and make final required connections to equipment, furnished under other Divisions of the Specifications or by the Owner.

1. Provide necessary labor and materials for a complete installation. Trap and vent drainage connections as required.

2. If equipment or fixtures furnished by others are not delivered prior to final acceptance, services shall be capped or plugged at walls or floor as directed, ready for future connection.

C. No equipment or fixture shall be "roughed-in" until proper rough-in drawings are provided to the installer.

D. Extend grease fittings to accessible locations.

2.11. CUTTING AND PATCHING

A. Provide cutting and patching required to perform the mechanical work, when alteration, repair, renovation, or addition, to existing construction is specified or required for new work.

B. Cutting of structural members will not be permitted except through explicit instructions from the Engineer. Reinforcing will be required where members are cut.

C. Do not endanger or damage installed work through procedures and processes of cutting and patching.

D. Arrange for repairs required to restore other work, because of damage caused as a result of mechanical installations.

E. No additional compensation will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.

F. Perform cutting, fitting, and patching required to:

1. Uncover Work to provide for installation of ill-timed Work.

2. Remove and replace defective Work.

3. Remove and replace Work not confirming to requirements of the Contract Documents.

4. Remove samples of installed Work as specified for testing.

5. Upon written instructions from Engineer, uncover and restore Work to

provide for Engineer observation of concealed Work.

2.12. GROUTING

A. Mix and install grout for mechanical equipment base bearing surfaces, base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

I. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.

2. Design Mix: 5,000-psi (34.5-MPa), 28-day compressive strength.

3. Packaging: Premixed and factory packaged.

2.13. SEISMIC

A. Mechanical systems shall be installed in conformance with the requirements of the state and federal codes and regulations for Seismic considerations, as specified and noted on the drawings.

B. All seismic restraining and snubbing devices shall be manufactured specifically for this duty. Devices constructed by the Contractor will not be accepted.

C. Contractor shall be responsible for the design and installation of the restraining and snubbing systems based on the criteria included on the drawings and in the specifications, and the actual equipment, and locations of installation.

2.14. START UP, TESTING, AND ADJUSTING

A. Contractor shall include adequate time in construction schedule for HVAC system start-up; testing, adjusting, and balancing; and control system installation,

programming, testing, and commissioning.

B. Each and every phase of the plumbing, air conditioning, heating and ventilating systems shall be operated separately, or in conjunction, one with the other, for a sufficient period of time to demonstrate to the entire satisfaction of the Engineer the ability of the systems to meet the capacity and the performance requirements while maintaining design conditions, in accordance with the intent of these specifications.

C. Previous to any performance tests, the Contractor shall have set and adjusted valves, dampers, motors, controllers, thermostats, and other items as are necessary to properly balance phases of the mechanical systems and shall have the systems operating and maintaining design temperatures, humidity, and air circulation throughout all areas of the building.

D. See other sections of these specifications for other possible records and tests to be made.

E. During the first-year warranty, the Contractor may be required to make some or all of the readings above to assure system is functioning properly through the various seasons. Contractor shall make additional adjustments as required.

2.15. PAINTING

A. Provide mechanical equipment with factory painted finish. Where factory finish is damaged during handling and installation, use touch-up paint of same type and color as original paint. Where extensive refinishing of factory applied finishes are required, equipment shall be repainted by the factory.

B. All uninsulated, ferrous equipment, tanks, pipes, fittings, pipe hangers, supports, miscellaneous steel, and ironwork without factory finish shall be primed and painted. Do not paint galvanized hanger rods or galvanized duct straps.

1. Where exposed to view, except in mechanical spaces, color shall be as selected by the Architect.

2. Where located in mechanical spaces or in areas not exposed to view, color shall be as directed by Owner's representative to match Owner's existing color schedule. In the absence of an Owner's color schedule, color shall be black.

C. All insulated mechanical equipment, tanks, and piping not provided with a factory finish shall be painted.

1. Where exposed to view, except in mechanical spaces, color shall be as selected by the Architect.

2. Where located in mechanical spaces or in areas not exposed to view, color shall be as directed by Owner's representative to match Owner's existing color schedule. In the absence of an Owner's color schedule, color shall

be black.

D. For uninsulated material to be painted, prime with one coat of alkyd primer and paint with two coats of alkyd enamel gloss. Paint shall be suitable for the environmental and temperature conditions where material is installed.

E. Paint insulated material with two coats of alkyd enamel gloss. Paint shall be suitable for the environmental and temperature conditions where material is installed.

F. Prepare surfaces for painting in accordance with the paint manufacturer's requirements. Remove or protect portions of the work which are not to be painted.

G. Apply primer coat(s) of paint as recommended by the paint manufacturer.

H. Apply final coat(s) of paint as recommended by the paint manufacturer. Apply paint by brush or roller as dictated by the surface to be painted. Paint should have a smooth appearance without cloudiness, spotting, marks, runs, or other surface imperfections.

I. Clean-up the area of materials, waste, and rubbish. Clean splattered surfaces.

J. Protect the work from damage. Touch-up and restore defaced painted surfaces at the end of the project.

2.16. NOISE: Contractor shall isolate pipes, ductwork, equipment, and other items to insure no additional noise is generated or transmitted to the building when systems are in operation.

2.17. ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment and elevation to support and anchor mechanical materials and equipment. See Paragraph 3.11 for painting.

B. Field Welding: Comply with AWS D1.1.

2.18. OPERATION INSTRUCTIONS

A. Contractor shall provide bound manuals containing complete repair parts' lists, and operating service and maintenance instructions for equipment provided. The manual shall include:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.

2. Manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions; regulation, control, stopping, shut-down, and emergency instructions; and summer and winter operating instructions.

3. Maintenance procedures for routine preventative maintenance and

troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.

4. Servicing and instructions and lubrication charts and schedules.

B. Contractor shall carefully instruct the Owner's operations personnel during the adjustment and testing period of the equipment for such length of time as may be necessary to thoroughly familiarize them with the proper care, operation, and maintenance of the equipment.

C. Contractor shall turn special tools, maintenance items, keys, other devices and materials required to operate or maintain the systems over to the Owner.

2.19. CLEAN UP

A. Do not allow waste material or rubbish to accumulate in or about jobsite. Clean work areas daily.

B. At completion of work, remove rubbish, tools, scaffolding, and surplus materials from and about building, leaving work clean and ready for use without further cleaning required. Clean equipment, piping, valves, fixtures, and fittings of grease, metal cuttings, insulation cement, dust, dirt, paper labels, and other materials that are not part of the final finish.

C. Any discoloration or other damage to parts of building, its finish or furnishings due to failure to properly clean or keep mechanical systems clean shall be repaired without cost to Owner.

2.20. NAMEPLATE DATA:

A. Provide permanent operational data nameplate on each item of power operated mechanical equipment, indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data.

B. Locate nameplates in an accessible location. Where manufacturer’s name plate is not stamped or engraved, provide additional heavy gauge aluminum or brass, stamped or engraved nameplate.

C. Do not remove manufacturer’s nameplates. When manufacturer’s nameplates are to be covered by insulation or other material, provide a separate nameplate for mounting on the exterior of the covering.

2.21. RECORD DOCUMENTS

A. At completion of this project, the Contractor shall provide Engineer with one set of "red lined" design drawings and specification showing all Work installed by him.

B. These documents shall incorporate all changes made in the course of the project

so as to enable the Owner to properly maintain, operate, and repair both exposed and concealed work. The redlines shall indicate changes:

1. Made by Contractor.

2. Addendum Items.

3. Change Orders.

4. Substitutions.

C. Drawings and specifications shall be updated during the progress of the work and kept at the job site.

D. Record Prints: Maintain one set of blue-line or black-line prints of the Contract Drawings, Submittals, and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.

b. Accurately record information in an understandable drawing technique.

c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2.22. FINAL PROJECT OBSERVATION: The final project observation shall not be made until the following items have been assembled and approved as indicated in other sections of the specifications.

A. Certificate of acceptance from local inspecting authorities.

B. Letter of compliance from the Controls Systems Provider indicating that the system is complete, fully operational, and installed as specified by manufacturer’s certified or licensed individuals.

C. Test and Balance report.

D. Owner's Operations and Maintenance manual.

E. Copies of bonds, insurance certificates, waivers, affidavits, warranties and guarantees, and other documents required in the specifications signed and ready for appropriate action.

F. Written notification from the Contractor that the work is complete and ready for final observation and the above documents are completed and available

G. Other documentation which may be required by the Engineer.

2.23. PROJECT CLOSEOUT

A. The final mechanical systems closeout shall not be completed until the Contractor has completed his work and submitted the documents required by Division 1 portions of the specifications. In addition the following work items and specific mechanical documents described in other portions of this specification section shall also be submitted and approved:

1. Record drawings.

2. Record specifications.

3. Guarantee and Warranties.

4. Operating and Maintenance Manuals (O&M). O&M Manuals shall also be provided to the Owner in duplicate. Manuals shall contain approved shop drawings, operations and maintenance instructions, parts manuals for HVAC equipment, an accurate set of design plans showing all construction revisions to the design set, and a copy of the test and balance report.

5. Final clean up.

6. Final Test and Balance Reports with startup logs.

7. Pipe and Equipment Identification.

8. Pipe test certifications.

9. Water treatment analysis and application.

10. Bonds, Insurance Certificates, Waivers, Affidavits, and other documents required in the specifications signed and ready for appropriate action.

11. Other items which may be required by the Engineer.

B. Confirm in writing that specified training specified has been completed with the Owner.

C. Confirm in writing that specified demonstrations have been completed with the Owner.

D. Confirm that test and balance is complete.

END OF SECTION

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SECTION 23020

MECHANICAL DEMOLITION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section describes the demolition, removal, relocation, rerouting and reconnection of existing mechanical facilities, as required, shown and specified herein, to accomplish alteration, restoration and to accommodate new construction.

B. The work shall include but not be limited to, draining, disconnecting, relocating, removing and dismantling, in a neat and workmanlike manner, the items and their accessories as indicated or Shown on the Contract Drawings.

1.02 REFERENCES

A. ANSI A10.6 – Safety Requirements for Demolition

B. National Association of Demolition Contractors (NADC) – Demolition Safety Manual

C. NFPA 51B – Cutting and Welding Processes

D. NFPA 70 – National Electrical Code

E. NFPA 241 – Safeguarding Building Construction and Demolition Operations

F. OSHA 29 CRF 1910 – Occupational Safety and Health Standards

G. US EPA – Clean Air Act Amendment of 1990.

1.03 SUBMITTALS

A. Demolition Schedule

B. Fire Watch Procedures

C. Inspection Report of Underground Piping Systems

D. Welding/Burning Permit – Obtain a welding/burning permit from the local Fire Official prior to the start of any welding or burning in accordance with the local Fire Code or as required by the Owner.

1.04 QUALITY ASSURANCE

A. Cutting, patching and removal shall be performed by workers skilled in the specific trades involved.

B. Job Conditions: Prior to start of work, make an inspection accompanied by the Engineer to determine physical condition of adjacent construction that is to remain.

1.05 SPECIAL PRECAUTIONS

A. Torch cutting of ductwork will not be permitted.

B. Torch cutting of other mechanical equipment will be permitted only as indicated by the Engineer.

C. Any cutting method, which may create sparks, must include “Fire Watch” as required by the Fire Code and/or Owner’s Fire Insurance Carrier. Submit fire watch procedures for approval.

D. Draining operations must not damage building components.

PART 2 - PRODUCTS

2.01 Adequately sized rubbish containers for the proper and safe disposal of all debris.

PART 3 - EXECUTION

3.01 PREPARATION

A. Construct temporary partitions prior to any demolition work enclosing respective work. Erect temporary fencing and signage around demolished materials. Use water sprinkling and other suitable methods to limit dust and dirt arising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.

B. Protect existing materials and equipment which are not to be demolished.

C. Prevent movement of structure; provide required bracing and shoring.

D. Do not begin the work until the time schedules and manner of operations have been approved by the Engineer and Owner. All interruptions of existing services shall be included in the schedules as approved by the Engineer and Owner.

3.02 GENERAL

A. Provide alteration and demolition of mechanical facilities as required by the contract drawings and specifications. The drawings are diagrammatic and do not show the exact location of all existing mechanical work. Where existing equipment shall remain in service during construction, provide rerouting and reconnection of mechanical services as required to maintain continuous service.

B. Review all equipment with the Engineer and Owner prior to disposal. Existing ductwork, piping, conduit and similar items to be abandoned that are not embedded in walls or floor slabs shall be completely removed unless otherwise shown on the drawings. Cap open ends at all walls and floors.

C. Remove, store and protect all equipment or materials to be reused by the Owner as shown on the drawings. Coordinate exact location of storage with the Owner. Items indicated to be removed, and not designated for Owner's salvage or for reuse, may be salvaged by Contractor. Transport salvaged items that are not to be reused from site as they are removed. Storage or sale of removed items on site will not be permitted.

D. Temporarily cap ends of ductwork to avoid entry of dirt, debris, or discharge of foul odors and gases.

E. Where existing louvers or ductwork penetrations are to remain, blank-off the louver on

the inside with galvanized sheet metal on both sides of 2-inch thick, 6 pcf density rigid fiberglass board insulation. Paint side attached to the louver with flat black paint.

F. Do not close or obstruct egress width to exits. Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walkways, occupied areas, and other adjacent occupied or used facilities. Ensure safe passage of persons around or through area of demolition operations to prevent injury to adjacent buildings, structures, other facilities, and persons.

G. Do not disable or disrupt building fire or life safety systems without five (5) days' prior written notice to the Engineer and Owner.

H. Conform to procedures applicable when discovering hazardous or contaminated materials.

I. Conduct demolition to minimize interference with adjacent building structures or Owner's operations.

J. Cease operations immediately if structure appears to be in danger or hazardous materials are encountered. Notify Architect/Engineer. Do not resume operations until directed.

K. Demolish in an orderly and careful manner. Do not cut or remove more than is necessary to accommodate the new construction or alteration.

L. Remove demolished materials from site daily. Do not burn or bury materials on site. Dispose of all material at an approved disposal facility.

M. Cover and protect floors, furniture, equipment and fixtures to avoid soiling or damage when demolition work is performed in rooms or areas from which such items have not been removed. Protect finished surfaces at all times and repair or replace, if damaged, to match existing construction to the satisfaction of the Engineer.

N. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.

O. Protect new and existing roofs from damage.

P. Do not interrupt existing utilities serving occupied portions of the facility, except when authorized in writing by Owner's representative. Provide temporary services during interruptions to existing utilities, as acceptable to the Owner. Contractor shall disconnect and seal only utilities to be demolished serving areas being demolished, prior to start of demolition work. If Contractor is required to disconnect utility services or other services to an occupied area, the Contractor shall provide temporary or alternative service to that area, as acceptable to the Owner.

3.03 PIPING REMOVAL

A. Cut off all welded piping square at the locations indicated on the drawings. No cutting will be required where the demolition ends at a flanged valve or equipment. Close off all openings of any remaining valves, piping or fittings with weld caps or blind flanges to prevent debris from entering the existing system.

B. Disconnect all threaded piping at the location indicated on the drawings. Close off all

openings of remaining valves, piping, fittings and equipment with pipe plugs or pipe caps as required to prevent debris from entering the existing systems.

C. Remove all pipe hangers, supports, miscellaneous steel and anchors with the piping.

3.04 PROTECTION FROM FREEZING

A. It is intended that the building remain protected from damage due to freezing temperatures. To that end, existing equipment and systems used for heating shall remain in place and in operation until scheduling permits shutdown.

B. Where the removal of equipment and/or existing systems will leave an area unprotected from freezing, notify the Owner and Engineer at least 72 hours in advance prior to removal so appropriate steps can be taken by the Owner to protect the area. Provide temporary heating equipment sufficient to prevent freezing.

C. It is the Contractor's responsibility to ensure that piping systems that are being worked on are completely drained from water prior to the start of demolition. If water is not drained and the piping freezes it is the Contractor's responsibility to replace piping at his own expense.

3.05 DISCONNECTION AND INTERRUPTION OF MECHANICAL SERVICES

A. When portions of an existing piping system or ductwork system are removed, and this removal causes loss of operation to another piece of equipment due to open (disconnected) piping or ductwork, then cap piping or ductwork or provide temporary piping or ductwork system to retain operation of various systems.

3.06 MECHANICAL EQUIPMENT REMOVAL

A. Remove all mechanical equipment as shown on the Contract Drawings. Remove all electrical work, including wiring between equipment, and wiring to power source or point of origin.

B. Where equipment is supported by steel and/or structural supports, remove these supports.

3.07 REFRIGERANT REMOVAL

A. Recover and dispose of all existing refrigerant charges in accordance with EPA regulations. Release of chlorofluorocarbon refrigerants to atmosphere is prohibited per the Clean Air Act Amendments of 1990.

3.08 DUCTWORK REMOVAL

A. Disconnect all ductwork, which must be removed, at the closest joint and resupport the remaining ductwork.

B. Prepare all remaining ductwork joints at the point of disconnection to receive new ducts or blank-off panels.

C. Remove all ductwork supports and miscellaneous steel with ductwork to be demolished.

3.09 INSULATION REMOVAL

A. Remove insulation, together with all piping, fittings, valves and equipment designated for demolition.

3.10 CONTROL WIRING REMOVAL

A. Disconnect and remove all control wiring and tubing, including conduit, for the Automatic Temperature Control (ATC) System associated with equipment to be removed.

END OF SECTION

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SECTION 23 00 30 - ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY:

A. This section specifies the basic requirements for electrical components which are to be provided for operation of mechanical equipment. These components include, but are not limited to, motors, starters, and disconnect switches when indicated, furnished as an integral part of packaged mechanical equipment, or furnished separately for mechanical equipment.

B. Furnish all motor controllers and contactors, not furnished as part of a motor control center, for proper operation of all motors.

C. Specific electrical requirements (i.e., horsepower and electrical characteristics) for mechanical equipment are specified within the individual equipment specification sections and scheduled on the drawings.

1.02 REFERENCES:

A. NEMA Standards MG 1: Motors and Generators.

B. NEMA Standard ICS 2: Industrial Control Devices, Controllers, and Assemblies.

C. NEMA Standard 250: Enclosures for Electrical Equipment.

D. NEMA Standard KS 1: Enclosed Switches.

E. National Electric Code (NFPA 70).

1.03 SUBMITTALS:

A. Separate submittal is not required. Submit product data for motors, starters, and other electrical components with submittal data required for the equipment for which it serves, as required by the individual equipment specification sections.

1.04 QUALITY ASSURANCE:

A. Electrical components and materials shall be UL labeled.

B. The electrical work shall comply with the National Electric Code.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. Equipment shall be by same manufacturer, except those items furnished by an equipment manufacturer as an integral part of his equipment. Where possible the equipment shall be by the same manufacturer specified in Division 16.

2.02 MOTORS: The following are basic requirements for simple or common motors. For special motors, more detailed and specific requirements are specified in the individual equipment specifications.

A. Torque characteristics shall be sufficient to satisfactorily accelerate the driven loads.

B. Motor sizes shall be large enough so that the driven load will not require the motor to operate in the service factor range.

C. 2-speed motors shall have 2 separate windings on poly-phase motors.

D. Temperature Rating: Rated for 40 degrees C. environment with maximum 90 degree C rise for continuous duty at full load (Class B insulation).

E. Starting Capability: Frequency of starts as indicated by automatic control system, and not less than 5 evenly spaced starts per hour for manually controlled motors.

F. Service Factor: 1.15 for poly-phase motors and 1.35 for single phase motors.

G. Motor Construction: NEMA Standard MG 1, general purpose, continuous duty, Design "B", except "C" where required for high starting torque.

1. Frames: NEMA Standard No. 48 or 56; use driven equipment manufacturer's standards to suit specific application.

2. Bearings:

a. Ball or roller bearings with inner and outer shaft seals.

b. Re-greasable, except permanently sealed where motor is normally inaccessible for regular maintenance.

c. Designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor.

d. For fractional horsepower, light duty motors, sleeve type bearings are permitted.

3. Enclosure Type:

a. Open drip-proof motors for indoor use where satisfactorily housed or remotely located during operation.

b. Guarded drip-proof motors where exposed to contact by employees or building occupants.

c. Weather protected Type I for outdoor use, Type II where not housed.

4. Overload Protection: Built-in thermal overload protection and, where indicated, internal sensing device suitable for signaling and stopping motor at starter.

5. Noise Rating: "Quiet".

6. Efficiency:

a. Motor shall comply with the efficiency requirements of the Energy Independence and Security Act of 2007.

b. Motors smaller than 1 HP shall have minimum full load efficiencies levels per NEMA Standards.

c. Motors 1 HP and larger shall be premium efficiency.

7. Nameplate: Indicate the full identification of manufacturer, ratings, characteristics, construction, special features and similar information.

2.03 STARTERS, ELECTRICAL DEVICES, AND WIRING:

A. Motor Starter Characteristics:

1. Enclosures: NEMA 1, general purpose enclosures with padlock ears, except in wet locations shall be NEMA 3R or NEMA 12 with conduit hubs installed by contractor, or units in hazardous locations which shall have NEC proper class and division.

2. Type and size of starter shall conform to adopted standards and recommended practices of the National Electric Code and Underwriters' Laboratories.

B. Manual Switches: Manual switches shall have:

1. Pilot lights and extra positions for multi-speed motors.

2. Overload protection: Melting alloy type thermal overload relays.

3. Manual starters / switches are to be used on fractional horsepower motors only.

C. Magnetic Starters:

1. Momentary contact push buttons and pilot lights, properly arranged for single speed or multi-speed operation as indicated.

2. Trip-free thermal overload relays, each phase.

3. Interlocks, witches and similar devices as required for coordination with control requirements of controls sections.

4. Built-in 120 volt control circuit transformer, with 2 primary and one secondary fuse, where service exceeds 240 volts. Fuses sized to carry holding coil circuit and other connected devices.

5. Externally operated manual reset.

6. Under-voltage release or protection (3-wire control).

7. Branch circuit protection shall meet type 2 coordination protection.

8. A hand-off-auto selector switch shall be provided in addition to start-stop buttons for all devices being controlled automatically.

9. Phase loss relay.

a. Provide protective relays with DPDT 600V rated contacts, locking potentiometer undervoltage adjustment, and LED indicating light at each starter for motors greater than 5 HP. Equal to Square D Class 8430, Type MPD, mounted in suitable enclosure.

D. Motor Connections:

1. Flexible conduit, except where plug-in electrical cords are specifically indicated.

E. Heater Contactors:

1. Contactors for resistance heat shall be by same manufacturer as starters unless furnished with heaters. Contactors shall be of the magnetic type and mounted in NEMA Type 1 general purpose enclosure. Contactors shall carry a UL listing and shall be rated for 100,000 cycles.

F. Disconnect Switches:

1. Fusible Switches: Fused, each phase; heavy duty; horsepower rated; non-teasible, quick-make, quick-break mechanism; dead front line side shield; solderless lugs suitable for copper or aluminum conductors; spring reinforced fuse clips; electro silver plated current carrying parts; hinged doors; operating lever arranged for locking in the "open" position; arc quenchers; capacity and characteristics as indicated.

2. Non-fusible Switches: For equipment less than 1 horsepower, switches shall be horsepower rated; toggle switch type; quantity of poles and voltage rating as indicated. For equipment 1 horsepower and larger, switches shall be the same as fusible type.

2.04 CAPACITORS:

A. Features:

1. Individual unit cells, all welded steel housing, each capacitor internally fused, non-flammable synthetic liquid impregnant, craft tissue insulation, and aluminum foil electrodes.

2. KVAR size shall be as required to correct motor power factor to 90 percent or better and shall be installed on all motors 1 horsepower and larger that have an uncorrected power factor of less than 85 percent at rated load.

PART 3 - EXECUTION

3.01 GENERAL

A. Install motors on motor mounting systems in accordance with motor manufacturer's instructions, securely anchored to resist torque, drive thrusts, and other external forces inherent in mechanical work. Secure sheaves and other drive units to motor shafts with keys and Allen set screws, except motors of 1/3 hp and less may be secured with Allen set screws on flat surface of shaft. Unless otherwise indicated, set motor shafts parallel with machine shafts.

B. Deliver starters and wiring devices which have not been factory-installed on equipment unit to electrical installer for installation.

C. Install starters and wiring devices at locations indicated, securely supported and anchored, and in accordance with manufacturer's installation instructions. Locate for proper operation access, including visibility, and for safety. Do not cover equipment data or informational tags when device is to be mounted on equipment.

D. Install control connections for motors to comply with NEC and applicable provisions of Electrical. Install equipment grounding except where non-grounded isolation of motor is indicated.

E. Connect protective relays to line side lugs of the motor starter and wire control contacts into motor starter circuit.

F. Label starters with engraved plastic nameplate describing the equipment served, e.g., "A.C. Unit No. 1". Nameplates shall be U.V. stabilized for use indoor / outdoor. Attach nameplates with clear silicone sealant.

END OF SECTION

SECTION 260000 - ELECTRICAL - GENERAL PROVISIONS

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials and equipment required and install complete and make operational, electrical system as shown on the Drawings and as specified herein.

B. The work shall include the following:

1. Coordinate the electrical service requirements with the power company and provide the electrical service(s) from the Power Company at the locations indicated.

2. Provide conduit, wire and field connections for all equipment, HVAC systems, panelboards, transformers, and electrical equipment furnished under Divisions 1, 11, 21, 22, 23, and 26.

C. Each bidder or their authorized representatives shall, before preparing their proposal, visit all areas of the existing buildings and structures in which work under this sub-bid is to be performed and inspect carefully the present installation. The submission of the proposal by this bidder shall be considered evidence that their representative has visited the buildings and structures and noted the locations and conditions under which the work will be performed and that he/she takes full responsibility for a complete knowledge of all factors governing his/her work.

2.1 SUBMITTALS

A. As a minimum all equipment specified in each Section of Division 26 shall be submitted at one time. As an example all lighting fixtures shall be submitted together, all motor control centers shall be submitted together, etc. Submittals that do not comply will be returned disapproved.

B. Mark submittals to clearly identify proposed equipment including accessories, options, and features and to exclude parts not applicable to the project. When manufacturer’s cut sheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Each submittal piece of literature and each submittal drawing shall clearly reference the Project Specification and/or Contract Drawing that the submittal is to cover. General catalogs will not be accepted as cut sheets to fulfill submittal requirements.

C. Check shop drawings for accuracy prior to submittal. Shop drawings shall be stamped with the date checked and a statement indicating that the shop drawings conform to this Section and the Drawings. This statement shall also list all exceptions to this Section and the Drawings. Mark submittals to identify proposed equipment including accessories, options and features being proposed for approval and exclude parts not to be used. Shop drawings not so checked and noted shall be returned marked NOT APPROVED.

D. The Engineer's check shall be for conformance with the design concept of the project and compliance with this Section and the Drawings. Errors and omissions on approved shop

drawings shall not relieve the Contractor from the responsibility of providing materials and workmanship required by this Section and the Drawings.

E. All dimensions shall be field verified at the job site and coordinated with the work of all other trades.

F. Material shall not be ordered or shipped until the shop drawings have been approved. No material shall be ordered or shop work started if shop drawings are marked “APPROVED AS NOTED - CONFIRM," "APPROVED AS NOTED - RESUBMIT" or "NOT APPROVED."

G. Operation and Maintenance Data

1. Submit operations and maintenance data for equipment furnished under this Division. The manuals shall be prepared specifically for this installation and shall include catalog data sheets, drawings, equipment lists, descriptions, parts lists including replacement part numbers, to instruct operating and maintenance personnel unfamiliar with such equipment.

2. Manuals shall include the following as a minimum:

a. A complete "As-Built" set of approved shop drawings.

b. A complete list of the equipment supplied, including serial numbers, ranges and pertinent data.

c. Detailed service, maintenance and operation instructions for each item supplied.

H. Exceptions for Submittals

1. Exceptions to the Specifications or Drawings shall be clearly defined by the Electrical Subcontractor in a separate section of each submittal package. The submittal shall contain the reason for the exception, the exact nature of the exception and the proposed substitution so that a proper evaluation may be made by the Engineer. The acceptability of any device or methodology submitted as an “or equal” or “exception” to the Specifications shall be at the sole discretion of the Engineer.

I. Submittals will be returned to the Contractor under one of the following codes.

Code 1 -"APPROVED" is assigned when there are no notations or comments on the submittal. When returned under this code the Contractor may release the equipment and/or material for manufacture.

Code 2 -"APPROVED AS NOTED" - This code is assigned when a confirmation of the notations and comments IS NOT required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product.

Code 3 -"APPROVED AS NOTED/CONFIRM" - This combination of codes is assigned when a confirmation of the notations and comments IS required by the Contractor. The Contractor may, at his own risk, release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product. This confirmation shall specifically

address each omission and nonconforming item that was noted. Confirmation is to be received by the Engineer within 10 calendar days of the date of the Engineer's transmittal requiring the confirmation.

Code 4 -"APPROVED AS NOTED/RESUBMIT" - This combination of codes is assigned when notations and comments are extensive enough to require a resubmittal of the package. This resubmittal is to address all comments, omissions and non-conforming items that were noted. Resubmittal is to be received by the Engineer within 15 calendar days of the date of the Engineer's transmittal requiring the resubmittal.

Code 5 -"NOT APPROVED" is assigned when the submittal does not meet the intent of the Contract Documents. The Contractor must resubmit the entire package revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the Contract Documents.

Code 6 -"COMMENTS ATTACHED" is assigned where there are comments attached to the returned submittal which provide additional data to aid the Contractor.

Code 7 -"RECEIPT ACKNOWLEDGED" - This code is assigned to acknowledge receipt of a submittal that is not subject to the Engineer’s review and approval; and, is being filed for informational purposes only. This code is generally used in acknowledging receipt of *means and methods of construction* work plan, field conformance test reports, and Health and Safety plans.

Codes 1 through 5 designate the status of the reviewed submittal with Code 6 showing there has been an attachment of additional data.

3.1 REFERENCE STANDARDS

A. Electric equipment, materials and installation shall comply with the National Electrical Code (NEC).

B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

4.1 PRIORITY OF THE CONTRACT DOCUMENTS

A. If, during the performance of the work, the Contractor finds a conflict, error or discrepancy between or among one or more of the Sections or between or among one or more Sections and the Drawings, furnish the higher performance requirements. The higher performance requirement shall be considered the equipment, material, device or installation method which represents the most stringent option, the highest quality or the largest quantity.

B. In all cases, figured dimensions shall govern over scaled dimensions, but work not dimensioned shall be as directed by the Engineer and work not particularly shown, identified, sized, or located shall be the same as similar work that is shown or specified.

C. Detailed Drawings shall govern over general drawings, larger scale Drawings take precedence over smaller scale Drawings, Change Order Drawings shall govern over Contract Drawings and Contract Drawings shall govern over Shop Drawings.

D. If the issue of priority is due to a conflict or discrepancy between the provisions of the Contract Documents and any referenced standard, or code of any technical society, organization or association, the provisions of the Contract Documents will take precedence if they are more stringent or presumptively cause a higher level of performance. If there is any conflict or discrepancy between standard specifications, or codes of any technical society, organization or association, or between Laws and Regulations, the higher performance requirement shall be binding on the Contractor, unless otherwise directed by the Engineer.

E. In accordance with the intent of the Contract Documents, the Contractor accepts the fact that compliance with the priority order specified shall not justify an increase in Contract Price or an extension in Contract Time nor limit in any way, the Contractor's responsibility to comply with all Laws and Regulations at all times

5.1 SERVICE AND METERING

A. Service will be obtained at 480 Volts, 3Phase, 4Wire, 60 Hz.

B. The Contractor shall be responsible for the following work:

1. Obtain an estimate from the power company for the work described above and include the cost of the power company work in the Bid Price.

2. Make all arrangements with the power company for obtaining electrical service, pay all power company charges.

6.1 CODES, INSPECTION AND FEES

A. Equipment, materials and installation shall comply with the requirements of the local authority having jurisdiction.

B. Obtain all necessary permits and pay all fees required for permits and inspections.

7.1 INTERPRETATION OF DRAWINGS

A. Unless specifically stated to the contrary, the Drawings do not show exact locations of conduit runs. Coordinate the conduit installation with other trades and the actual supplied equipment.

B. Install each 3 phase circuit in a separate conduit unless otherwise shown on the Drawings.

C. Conduit shown exposed shall be installed exposed; conduit shown concealed shall be installed concealed. Unless otherwise indicated install branch circuit conduits exposed in process/ industrial type spaces and concealed in finished spaces.

D. Where circuits are shown as "home-runs" all necessary fittings and boxes shall be provided for a complete raceway installation. Where home-runs indicate conduit is to be installed concealed or exposed the entire branch circuit shall be installed in the same manner.

E. Verify the exact locations and mounting heights of lighting fixtures, switches and receptacles prior to installation.

F. Except where dimensions are shown, the locations of equipment, fixtures, outlets and similar devices shown on the Drawings are approximate only. Exact locations shall be determined by the Contractor and approved by the Engineer during construction. Obtain information relevant to the placing of electrical work and in case of any interference with other work, proceed as directed by the Engineer and furnish all labor and materials necessary to complete the work in an approved manner.

G. Circuit layouts are not intended to show the number of fittings, or other installation details. Furnish all labor and materials to install and place in satisfactory operation all power, lighting and other electrical systems shown.

H. Redesign of electrical or mechanical work, which is required due to the Contractor's use of an alternate item, arrangement of equipment and/or layout other than specified herein, shall be done by the Contractor at his/her own expense. Redesign and detailed plans shall be submitted to the Engineer for approval. No additional compensation will be provided for changes in the work, either his/her own or others, caused by such redesign.

I. Raceways and conductors for low voltage (120 Volts) thermostats controlling HVAC unit heaters, exhaust fans and similar equipment are not shown on the Drawings. Provide raceways and conductors between the thermostats, the HVAC equipment and the motor starters for a complete and operating system. Raceways shall be installed concealed in all finished space and may be installed concealed or exposed in process spaces. Refer to the HVAC drawings for the locations of the thermostats.

8.1 SIZE OF EQUIPMENT

A. Investigate each space in the structure through which electrical equipment furnished under Division 26 must pass to reach its final location. Coordinate shipping splits with the manufacturer to permit safe handling and passage through restricted areas in the structure.

B. The equipment shall be kept upright at all times during storage and handling. When equipment must be tilted for passage through restricted areas, brace the equipment to ensure that the tilting does not impair the functional integrity of the equipment.

9.1 RECORD DRAWINGS

A. As the work progresses, legibly record all field changes on a set of Project Contract Drawings, hereinafter called the "Record Drawings."

10.1 MATERIALS AND EQUIPMENT

A. Materials and equipment furnished under this contract shall be new.

B. Material and equipment of the same type shall be the product of one manufacturer and shall be UL listed.

11.1 EQUIPMENT IDENTIFICATION

A. Identify equipment, disconnect switches, separately mounted motor starters, control stations, etc. furnished under Division 26 with the name of the equipment it serves. Motor control centers, control panels, panelboards, switchboards, switchgear, junction or terminal boxes, transfer switches, etc, shall have nameplate designations as shown on the Drawings.

B. Nameplates shall be engraved, laminated plastic, not less than 1/16-in thick by 3/4-in by 2-1/2-in with 3/16-in high white letters on a black background.

C. Nameplates shall be screw mounted to NEMA 1 enclosures. Nameplates shall be bonded to all other enclosure types using an epoxy or similar permanent waterproof adhesive. Two sided foam adhesive tape is not acceptable. Where the equipment size does not have space for mounting a nameplate the nameplate shall be permanently fastened to the adjacent mounting surface.

PART 2 EXECUTION

1.1 INSTALLATION

A. Work not installed according to the Drawings and Specification shall be subject to change as directed by the Engineer at Contractor's expense.

B. Electrical equipment shall be protected against mechanical and water damage. Store all electrical equipment in dry permanent shelters. Do not install electrical equipment in place until structures are weather-tight.

C. Damaged equipment shall be replaced or repaired by the equipment manufacturer, at the Engineer's discretion and at the Contractor's expense.

D. Repaint any damage to factory applied paint finish using touch-up paint furnished by the equipment manufacturer.

2.1 WORK SUPERVISION

A. The Contractor shall designate in writing the qualified electrical supervisor who shall provide supervision to all electrical work on this project. The minimum qualifications for the electrical supervisor shall be a master electrician as defined by the Arkansas Board of Electrical Examiners. The supervisor or his appointed alternate possessing at least a journeyman electrician license shall be on site whenever electrical work is being performed. The qualifications of the electrical supervisor shall be subject to approval of the Owner and the Engineer.

B. All master and journeyman electricians shall be licensed in accordance with Arkansas Code Title 17 Chapter 28 - Electricians. The website located at http://www.arkleg.state.ar.us publishes the text of this statutory requirement. No unlicensed electrical workers shall perform work on this project. Apprentice electricians in a ratio of not more than one apprentice per journeyman electrician will be allowed if the apprentices are licensed and actively participating in an apprenticeship program recognized and approved by the Arkansas Board of Electrical Examiners.

END OF SECTION 260000

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copper building wire rated 600 V or less.
2. Connectors, splices, and terminations rated 600 V and less.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: Indicate type, use, location, and termination locations.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Cerro Wire LLC.
2. General Cable Technologies Corporation.
3. Okonite Company (The).
4. Southwire Company.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. RoHS compliant.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.

E. Conductor Insulation:

1. Type NM: Comply with UL 83 and UL 719.
2. Type RHH and Type RHW-2: Comply with UL 44.
3. Type USE-2 and Type SE: Comply with UL 854.
4. Type THHN and Type THWN-2: Comply with UL 83.
5. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
6. Type XHHW-2: Comply with UL 44.

2.2 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

C. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.

1. Material: Copper.
2. Type: One hole with long barrels.
3. Termination: Compression.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger. Branch Circuits: Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.

B. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN/THWN-2, single conductors in raceway.

B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.

E. Feeders in Cable Tray: Type THHN/THWN-2, single conductors in raceway.

F. Exposed Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

G. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.7 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes grounding and bonding systems and equipment.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article.

B. Qualification Data: For testing agency and testing agency's field supervisor.

C. Field quality-control reports.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Burndy; Part of Hubbell Electrical Systems.
2. O-Z/Gedney; a brand of Emerson Industrial Automation.
3. Thomas & Betts Corporation; A Member of the ABB Group.

2.3 CONDUCTORS

A. Conductors shall be as specified under Section 260519 “Low-Voltage Electrical Power Conductors and Cables.”

2.4 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

C. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

D. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.

E. Cable-to-Cable Connectors: Compression type, copper or copper alloy.

F. Conduit Hubs: Mechanical type, terminal with threaded hub.

G. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.

H. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.

I. Lay-in Lug Connector: Mechanical type, copper rated for direct burial terminal with set screw.

J. Water Pipe Clamps:

1. Mechanical type, two pieces with stainless-steel bolts.

a. Material: Die-cast zinc alloy.
b. Listed for direct burial.

2.5 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet.

B. Ground Plates: 1/4 inch thick, hot-dip galvanized.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install barecopper conductor, **No. 4/0** AWG minimum.

1. Bury at least 24 inches below grade.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.

3.4 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.

C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

D. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes;

use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.

    a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method according to IEEE 81.

C. Grounding system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Report measured ground resistances that exceed 5 ohms.

F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel slotted support systems.
2. Conduit and cable support devices.
3. Support for conductors in vertical conduit.
4. Structural steel for fabricated supports and restraints.
5. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
6. Fabricated metal equipment support assemblies.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For fabrication and installation details for electrical hangers and support systems.

1. Hangers. Include product data for components.
2. Slotted support systems.
3. Equipment supports.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch-(10-mm-) diameter holes at a maximum of 8 inches (200 mm) o.c. in at least one surface.
1. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
2. Material for Channel, Fittings, and Accessories: Galvanized steel.
3. Channel Width: 1-5/8 inches.
4. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
5. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
6. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
7. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:

1. NECA 1.
2. NECA 101

B. Comply with requirements in "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.

C. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
6. To Steel: Beam clamps (MSS SP-58,Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate

D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

B. Field Welding: Comply with AWS D1.1/D1.1M.

END OF SECTION 260529

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SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal conduits and fittings.
2. Nonmetallic conduits and fittings.
3. Metal wireways and auxiliary gutters.
4. Nonmetal wireways and auxiliary gutters.
5. Boxes, enclosures, and cabinets.
6. Handholes and boxes for exterior underground cabling.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

A. Metal Conduit:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Allied Tube & Conduit; a part of Atkore International.
b. Republic Conduit.
c. Thomas & Betts Corporation; A Member of the ABB Group.

2. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

3. GRC: Comply with ANSI C80.1 and UL 6.
4. IMC: Comply with ANSI C80.6 and UL 1242.
5. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.

a. Comply with NEMA RN 1.
b. Coating Thickness: 0.040 inch, minimum.

6. EMT: Comply with ANSI C80.3 and UL 797.
7. FMC: Comply with UL 1; zinc-coated steel.
8. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

B. Metal Fittings: Comply with NEMA FB 1 and UL 514B.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Allied Tube & Conduit; a part of Atkore International.
   b. Republic Conduit.
   c. Thomas & Betts Corporation; A Member of the ABB Group.

2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

3. Fittings, General: Listed and labeled for type of conduit, location, and use.
4. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
5. Fittings for EMT:

   a. Material: Steel.
   b. Type: Compression.

6. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
7. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.

C. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS AND FITTINGS

A. Nonmetallic Conduit:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. CANTEX INC.
   b. RACO; Hubbell.
   c. Thomas & Betts Corporation; A Member of the ABB Group.

B. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1. ENT: Comply with NEMA TC 13 and UL 1653.
2. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
3. LFNC: Comply with UL 1660.

C. Nonmetallic Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. CANTEX INC.
   b. RACO; Hubbell.
   c. Thomas & Betts Corporation; A Member of the ABB Group.

2. Fittings, General: Listed and labeled for type of conduit, location, and use.

3. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
4. Fittings for LFNC: Comply with UL 514B.
5. Solvents and Adhesives: As recommended by conduit manufacturer.

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1, Type 3R, Type 4, or Type 12 based on installation location, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.4 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Crouse-Hinds, an Eaton business.
2. Hoffman; a brand of Pentair Equipment Protection.
3. Hubbell Incorporated; Wiring Device-Kellems.
4. Thomas & Betts Corporation; A Member of the ABB Group.
5. Wiremold / Legrand.

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

F. Metal Floor Boxes:

1. Material: Cast metal.
2. Type: Fully adjustable.
3. Shape: Rectangular.
4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.

H. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

I. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.

J. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

K. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.

L. Gangable boxes are prohibited.

2.5 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. General Requirements for Handholes and Boxes:

1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Quazite: Hubbell Power Systems, Inc.

2. Standard: Comply with SCTE 77.
3. Configuration: Designed for flush burial with closed bottom unless otherwise indicated.

4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
6. Cover Legend: Molded lettering, "ELECTRIC.".
7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC.
2. Concealed Conduit, Aboveground: GRC.
3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply raceway products as specified below unless otherwise indicated.

1. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:

    a. Loading dock.
    b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    c. Mechanical rooms.
    d. Electrical rooms
    e. Gymnasiums.

2. Concealed in Ceilings and Interior Walls and Partitions: EMT.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
4. Damp or Wet Locations: GRC.
5. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.

4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

F. Install surface raceways only where indicated on Drawings.

G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.

D. Do not fasten conduits onto the bottom side of a metal deck roof.

E. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

F. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

G. Arrange stub-ups so curved portions of bends are not visible above finished slab.

H. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

I. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.

J. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

K. Support conduit within 12 inchesof enclosures to which attached.

L. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.

2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
5. Change from ENT to GRC before rising above floor.

M. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

N. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

O. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

P. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

Q. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

R. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet.
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
    c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
    d. Attics: 135 deg F temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per degree F of temperature change for PVC conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

S. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC in damp or wet locations not subject to severe physical damage.

T. Mount boxes at heights indicated on Drawings or in Specification 262726 “Wiring Devices”. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

U. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between the box and cover plate or the supported equipment and box.

V. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

W. Locate boxes so that cover or plate will not span different building finishes.

X. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

Y. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

Z. Set metal floor boxes level and flush with finished floor surface.

AA. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit.
2. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified.
3. Install manufactured duct elbows for stub-up at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.

b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

5. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

D. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.6 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

3.7 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

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SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

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. Color and legend requirements for raceways, conductors, and warning labels and signs.
2. Labels.
3. Tapes and stencils.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 70.

B. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

C. Comply with ANSI Z535.4 for safety signs and labels.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.

1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.

2. Colors for 208/120-V Circuits:
   a. Phase A: Black.
   b. Phase B: Red.
   c. Phase C: Blue.

3. Colors for 480/277-V Circuits:
    a. Phase A: Brown.
    b. Phase B: Orange.
    c. Phase C: Yellow.

4. Color for Neutral: White.
5. Color for Equipment Grounds: Green.
6. Colors for Isolated Grounds: Green with white stripe.

B. Warning Label Colors:

1. Identify system voltage with black letters on an orange background.

C. Equipment Identification Labels:

1. Black letters on a white field.

2.3 TAPES AND STENCILS

A. Underground-Line Warning Tape:
1. Tape:

    a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
    b. Printing on tape shall be permanent and shall not be damaged by burial operations.
    c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

2. Color and Printing:

    a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
    b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE"
    c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE"

2.4 SIGNS

A. Laminated Acrylic or Melamine Plastic Signs:
1. Engraved legend.
2. Thickness:

    a. For signs up to 20 sq. in. (129 sq. cm), minimum 1/16 inch (1.6 mm) thick.
    b. For signs larger than 20 sq. in. (129 sq. cm), 1/8 inch (3.2 mm) thick.
    c. Engraved legend with black letters on white face.
    d. Self-adhesive.
    e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.5 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of each item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

G. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

H. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

J. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.

K. Underground Line Warning Tape:

1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches (150 to 200 mm) below finished grade. Use

multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches (400 mm) overall.

2. Install underground-line warning tape for direct-buried cables and cables in raceways.

3.2 IDENTIFICATION SCHEDULE

A. Equipment Identification Labels:

1. Indoor Equipment: Self-adhesive label.
2. Outdoor Equipment: Laminated acrylic or melamine sign.

END OF SECTION 260553

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Distribution panelboards.
2. Lighting and appliance branch-circuit panelboards.

1.2 DEFINITIONS

A. MCCB: Molded-case circuit breaker.

B. SPD: Surge protective device.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of panelboard.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details.
2. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
3. Detail bus configuration, current, and voltage ratings.
4. Short-circuit current rating of panelboards and overcurrent protective devices.
5. Include evidence of NRTL listing for series rating of installed devices.
6. Include evidence of NRTL listing for SPD as installed in panelboard.
7. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
8. Include wiring diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Panelboard schedules for installation in panelboards.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 FIELD CONDITIONS

A. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.

1. Panelboard Warranty Period: 18 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANELBOARDS COMMON REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA PB 1.

C. Comply with NFPA 70.

D. Enclosures: Flush or Surface-mounted, dead-front cabinets.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
b. Outdoor Locations: NEMA 250, Type 3R.
c. Wash-Down Areas: NEMA 250, Type 4X,.
d. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
e. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

2. Height: 84 inches maximum.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.

E. Phase, Neutral, and Ground Buses: Hard-drawn copper, 98 percent conductivity.

F. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
3. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.

4. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

G. Future Devices: Panelboards shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

H. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

2.2 PERFORMANCE REQUIREMENTS

A. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD Type 1 or Type 2 as shown on drawings.

2.3 POWER PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Eaton.
2. SIEMENS Industry, Inc.; Energy Management Division.
3. Square D; by Schneider Electric.
    a. If Square D, project shall be quoted, ordered, and managed by Randall Robinette in Little Rock Field Office. Phone# 501-803-9494.

B. Panelboards: NEMA PB 1, distribution type.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Eaton.
2. SIEMENS Industry, Inc.; Energy Management Division.
3. Square D; by Schneider Electric.
    a. If Square D, project shall be quoted, ordered, and managed by Randall Robinette in Little Rock Field Office. Phone# 501-803-9494.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

2.5 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. SIEMENS Industry, Inc.; Energy Management Division.

3. Square D; by Schneider Electric.
    a. If Square D, project shall be quoted, ordered, and managed by Randall Robinette in Little Rock Field Office. Phone# 501-803-9494.

B. All circuit breakers 1200A and higher shall be equipped with energy-reducing maintenance switching with local status in order to provide arc energy reduction per NEC 240.87

C. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers:

    a. Inverse time-current element for low-level overloads.
    b. Instantaneous magnetic trip element for short circuits.
    c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic Trip Circuit Breakers:

    a. RMS sensing.
    b. Field-replaceable rating plug or electronic trip.
    c. Field-Adjustable Settings:

        1) Instantaneous trip.
        2) Long- and short-time pickup levels.
        3) Long and short time adjustments.
        4) Ground-fault pickup level, time delay, and I squared T response.

4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
5. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
6. Subfeed Circuit Breakers: Vertically mounted.
7. MCCB Features and Accessories:

    a. Standard frame sizes, trip ratings, and number of poles.
    b. Breaker handle indicates tripped status.

2.6 IDENTIFICATION

A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.

B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

C. Circuit Directory: Directory card inside panelboard door, mounted in transparent card holder.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install panelboards and accessories according to NEMA PB 1.1.

C. Mount panelboard cabinet plumb and rigid without distortion of box.

D. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

E. Install overcurrent protective devices and controllers not already factory installed.

F. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

G. Install filler plates in unused spaces.

H. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

D. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Straight-blade convenience receptacles.
2. USB charger devices.
3. GFCI receptacles.
4. Toggle switches.
5. Wall plates.

1.2 DEFINITIONS

A. Abbreviations of Manufacturers' Names:

1. Cooper: Copper Wiring Devices; Division of Cooper Industries, Inc.
2. Hubbell: Hubbell Incorporated: Wiring Devices-Kellems.
3. Leviton: Leviton Mfg. Company, Inc.
4. Pass & Seymour: Pass& Seymour/Legrand.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with the requirements in this Section.

D. Devices for Owner-Furnished Equipment:

1. Receptacles: Match plug configurations.

E. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 STRAIGHT-BLADE RECEPTACLES

A. Duplex Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Hubbell Incorporated; Wiring Device-Kellems.
b. Leviton Manufacturing Co., Inc.
c. Pass & Seymour/Legrand (Pass & Seymour).

2. All receptacle devices in childcare facilities, preschool, and elementary education facilities shall be tamper-resistant. All devices shall meet requirements of NEC 406.12.

2.3 USB CHARGER DEVICES

A. Tamper-Resistant, USB Charger Receptacles: 12 V, 2.0 A, USB Type A; Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498 Supplement sd, UL 1310, and FS W-C-596.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Hubbell Incorporated; Wiring Device-Kellems.
b. Leviton Manufacturing Co., Inc.
c. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Single-piece, rivetless, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap.

3. USB Receptacles: Dual, Type A.
4. Line Voltage Receptacles: Dual, two pole, three wire, and self-grounding.

2.4 GFCI RECEPTACLES

A. General Description:

1. 125 V, 20 A, straight blade, feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Hubbell Incorporated; Wiring Device-Kellems.
    b. Leviton Manufacturing Co., Inc.
    c. Pass & Seymour/Legrand (Pass & Seymour).

C. Tamper-Resistant, Duplex GFCI Convenience Receptacles:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hubbell Incorporated; Wiring Device-Kellems.
    b. Pass & Seymour/Legrand (Pass & Seymour).

2.5 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:

1. Single Pole:

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Hubbell Incorporated; Wiring Device-Kellems.
        2) Leviton Manufacturing Co., Inc.
        3) Pass & Seymour/Legrand (Pass & Seymour).

2. Two Pole:

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Hubbell Incorporated; Wiring Device-Kellems.
        2) Leviton Manufacturing Co., Inc.
        3) Pass & Seymour/Legrand (Pass & Seymour).

3. Three Way:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Hubbell Incorporated; Wiring Device-Kellems.
2) Leviton Manufacturing Co., Inc.
3) Pass & Seymour/Legrand (Pass & Seymour).

2.6 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Coordinate with architect for finish and color selection.
3. Material for Unfinished Spaces: Galvanized steel.
4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.7 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.
2. Wiring Devices Connected to Emergency Power System: Red.
3. SPD Devices: Blue.
4. Isolated-Ground Receptacles: Orange.

B. Wall Plate Color: For plastic covers, match device color.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1 unless otherwise indicated.

B. Mount Devices at the heights listed below unless listed specifically on drawings:
1. Exterior Outlet Boxes: 24” Above Finished Grade
2. Interior Outlet Boxes: 18” Above Finished Floor (AFF)
3. Device Boxes for Switches, Fire Alarm Pull Stations, Intercom Call Stations, etc.: 48” AFF
4. Outlet Boxes for Wall-mounted clocks: 96” AFF or 6” below the ceiling when not possible. Center clock outlets located above doors between the ceiling and the top of the door trip.

5. Above Counter Outlet and Junction Boxes: 8” above countertop surfaces or at backsplash level.
6. Coordinate mounting height of specific-use receptacles with equipment and finishes.
7. Coordinate mounting height to match mechanical devices (thermostats).

C. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

D. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:

    a. Cut back and pigtail, or replace all damaged conductors.
    b. Straighten conductors that remain and remove corrosion and foreign matter.
    c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

E. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan-speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

I. GFCI Receptacles: Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.2 FIELD QUALITY CONTROL

A. Test Instruments: Use instruments that comply with UL 1436.

B. Perform the following tests and inspections:

1. Tests for Convenience Receptacles:

a. Line Voltage: Acceptable range is 105 to 132 V.
b. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
c. Ground Impedance: Values of up to 2 ohms are acceptable.
d. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
e. Using the test plug, verify that the device and its outlet box are securely mounted.
f. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

C. Wiring device will be considered defective if it does not pass tests and inspections.

END OF SECTION 262726

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Molded-case circuit breakers (MCCBs).
4. Molded-case switches.
5. Horsepower Rated Toggle Disconnect Switch
6. Enclosures.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

B. Shop Drawings: For enclosed switches and circuit breakers.

1. Include plans, elevations, sections, details, and attachments to other work.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: One year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

D. Comply with NFPA 70.

2.2 FUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Eaton.
2. SIEMENS Industry, Inc.; Energy Management Division.
3. Square D; by Schneider Electric.
    a. If Square D, project shall be quoted, ordered, and managed by Randall Robinette in Little Rock Field Office. Phone# 501-803-9494.

B. Type HD, Heavy Duty:

1. Single throw.
2. Three pole.
3. 600-V ac.
4. 1200 A and smaller.
5. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses.
6. Lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories (as required per plans):

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Isolated Ground Kit: Internally mounted; insulated, labeled for copper and aluminum neutral conductors.
4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
5. Service-Rated Switches: Labeled for use as service equipment.

2.3 NONFUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Eaton.
2. SIEMENS Industry, Inc.; Energy Management Division.

3. Square D; by Schneider Electric.
    a. If Square D, project shall be quoted, ordered, and managed by Randall Robinette in Little Rock Field Office. Phone# 501-803-9494.

B. Type HD, Heavy Duty, Three Pole, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories (as required per plans):

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Isolated Ground Kit: Internally mounted; insulated, labeled for copper and aluminum neutral conductors.
4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
5. Service-Rated Switches: Labeled for use as service equipment.

2.4 MOLDED-CASE CIRCUIT BREAKERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Eaton.
2. SIEMENS Industry, Inc.; Energy Management Division.
3. Square D; by Schneider Electric.
    a. If Square D, project shall be quoted, ordered, and managed by Randall Robinette in Little Rock Field Office. Phone# 501-803-9494.

B. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.

C. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.

D. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker. Circuit breakers shall be 100 percent rated or series rated as indicated on the Drawings. combinations for series connected interrupting ratings shall be listed by UL as recognized component combinations. Any series rated combination used shall be marked on the end-use equipment along with the statement "Caution - Series Rated System. _____ Amps Available. Identical Replacement Component Required."

E. MCCBs shall be equipped with a device for locking in the isolated position.

F. Lugs shall be suitable for 167 deg F rated wire.

G. Standards: Comply with UL 489 with interrupting capacity to comply with available fault currents.

H. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

I. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

J. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the field-adjustable settings as indicated on drawings.

K. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

2.5 Horsepower Rated, Toggle Switch Type Disconnect Switch

A. Toggle type disconnect switches shall be manufactured of thermoplastic materials with screw-type terminals. The switches shall be rated 600 VAC and 20A at 600 VAC.

B. Toggle type disconnect switches shall be similar to a manual non-reversing starter without overloads and shall be 3 Pole, capable of "on-off" control of a 10 horsepower motor at 460 VAC.

C. Enclosure shall be provided with lock off provisions.

D. NEMA 4 enclosures shall be die-cast zinc.

E. Switches shall be as manufactured by the Square D Co.; Siemens Electrical Products; Cutler-Hammer or equal.

2.6 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

B. Enclosure rating shall be equal to or greater than the fuse or circuit breaker rating.

C. Enclosure Finish: The enclosure shall be as indicated on drawings.

D. Conduit Entry: NEMA 250 Types 4, 4X, and 12 enclosures shall contain no knockouts. NEMA 250 Types 7 and 9 enclosures shall be provided with threaded conduit openings in both endwalls.

E. Operating Mechanism: The circuit-breaker operating handle shall be externally operable with the operating mechanism being an integral part of the box, not the cover. The cover interlock mechanism shall have an externally operated override. The override shall not permanently disable the interlock mechanism, which shall return to the locked position once the override is released. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

F. Enclosures designated as NEMA 250 Type 4, 4X stainless steel, 12, or 12K shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.

G. NEMA 250 Type 7/9 enclosures shall be furnished with a breather and drain kit to allow their use in outdoor and wet location applications.

PART 3 - EXECUTION

3.1 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Outdoor Locations: NEMA 250, Type 3R.
3. Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

3.2 INSTALLATION

A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Owner no fewer than seven days in advance of proposed interruption of electric service.
2. Indicate method of providing temporary electric service.
3. Do not proceed with interruption of electric service without Owner's written permission.
4. Comply with NFPA 70E.

B. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

C. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

D. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

E. Install fuses in fusible devices. Fuse Ratings for mechanical equipment or transformers shall match the rating of the upstream circuit breaker feeding the equipment.

F. Comply with NFPA 70 and NECA 1.

3.3 IDENTIFICATION

A. Comply with requirements in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.
    a. Label on each disconnect means shall include both purpose and source, such as “AHU-1. Fed from Panel MDP”

3.4 FIELD QUALITY CONTROL

A. Tests and Inspections for Switches:

1. Visual and Mechanical Inspection:

    a. Inspect physical and mechanical condition.
    b. Inspect anchorage, alignment, grounding, and clearances.
    c. Verify that the unit is clean.
    d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
    e. Verify that fuse sizes and types match the Specifications and Drawings.
    f. Verify that each fuse has adequate mechanical support and contact integrity.
    g. Inspect bolted electrical connections for high resistance using one of the two following methods:

        1) Use a low-resistance ohmmeter.

            a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.

        2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.

            a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

    h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
    i. Verify correct phase barrier installation.

j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.

B. Tests and Inspections for Molded Case Circuit Breakers:

1. Visual and Mechanical Inspection:

a. Verify that equipment nameplate data are as described in the Specifications and shown on the Drawings.
b. Inspect physical and mechanical condition.
c. Inspect anchorage, alignment, grounding, and clearances.
d. Verify that the unit is clean.
e. Operate the circuit breaker to ensure smooth operation.
f. Inspect bolted electrical connections for high resistance using one of the two following methods:

1) Use a low-resistance ohmmeter.

a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.

2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.

a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

g. Inspect operating mechanism, contacts, and chutes in unsealed units.
h. Perform adjustments for final protective device settings in accordance with the coordination study.

C. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

END OF SECTION 262816

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SECTION 31 10 00

SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Removing surface debris.
   2. Removing designated trees, shrubs, and other plant life.
   3. Excavating topsoil.

1.2 SUBMITTALS

A. Section 013300 – Submittal procedures.

B. Product Data: Submit data for herbicide. Indicate compliance with applicable codes for environmental protection.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with all applicable codes, and City of Birdeye Ordinances.

B. Conform to applicable City of Birdeye code for environmental requirements, disposal of debris, and use of herbicides.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing plant life designated to remain is tagged or identified.

B. Identify salvage area for placing removed materials.

3.2 PREPARATION

A. Call “One Call”, the local utility locating service at 811 not less than three working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

3.3 PROTECTION

A. Locate, identify, and protect utilities indicated to remain, from damage.

B. Protect trees, plant growth, and features designated to remain, as final landscaping

C. Protect bench marks, survey control points, and existing structures from damage or displacement.

3.4 CLEARING

A. Remove trees and shrubs within areas indicated on Drawings. Remove stumps, main root ball, and root system to depth of 12 inches below existing grade or proposed grade, whichever is lower.

B. Clear undergrowth and deadwood, without disturbing subsoil.

3.5 VEGETATION

A. Do not remove or damage vegetation beyond the limits indicated on drawings.
   1. 40 feet outside the building perimeter.
   2. 10 feet each side of surface walkways, patios, surface parking, and utility lines less than 12 inches in diameter.
   3. 15 feet each side of roadway curbs and main utility trenches.
   4. 25 feet outside perimeter of pervious paving areas that must not be compacted by construction traffic.

B. Install substantial, highly visible fences at least 4 feet high to prevent inadvertent damage to vegetation to remain:
   1. At vegetation removal limits.
   2. See Section 01 5639 for fence construction requirements.

C. In areas where vegetation must be removed but no construction will occur other than pervious paving, remove vegetation with minimum disturbance of the subsoil.

D. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.
   1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.
   2. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.
   3. Existing Stumps: Treat as specified for other vegetation removed; remove stumps and roots to depth of 12 inches.
   4. Sod: Re-use on site if possible; otherwise sell if marketable, and if not, treat as specified for other vegetation removed.

E. Dead Wood: Remove all dead trees (standing or down), limbs, and dry brush on entire site; treat as specified for vegetation removed.

F. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Arkansas Department of Veterans Affairs.

3.6 REMOVAL

A. Remove debris, rock, and extracted plant life from site.

B. Partially remove paving and curbs as indicated on Drawings. Neatly saw cut edges at right angle to surface.

C. Remove abandoned utilities. Indicated removal termination point for underground utilities on Record Documents.

D. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.

E. Do not burn or bury materials on site. Leave site in clean condition.

3.7 TOPSOIL EXCAVATION

A. Excavate topsoil from areas to be further excavated, re-landscaped, or re-graded without mixing with foreign materials for use in finish grading.

B. Do not excavate wet topsoil.

C. Stockpile in area designated on site to depth not exceeding 8 feet and protect from erosion. Stockpile material on impervious material until disposal.

D. Remove excess topsoil not intended for reuse, from site.

END OF SECTION

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SECTION 31 20 00

EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for, slabs-on-grade, walks, pavements, turf, and grasses, and plants.
3. Excavating and backfilling for buildings and structures.
4. Drainage course for concrete slabs-on-grade.
5. Subbase course for concrete walks, pavements.
6. Subbase course and base course for asphalt paving.
7. Excavating and backfilling trenches for utilities and pits for buried utility structures.

1.2 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct pre-excavation conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

A. Material test reports.

1.5 FIELD CONDITIONS

A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth-moving operations.

1.6 MEASUREMENT AND PAYMENT FOR ROCK EXCAVATION

A. Definition: Rock excavation includes all rock in formation which cannot be removed with Caterpillar D9 Series or comparable size tractor-shovel and for ledge rock using same equipment with single hydraulic tooth mounted thereon. Also includes detached rock and boulders larger than 1/2 cubic yard each.

B. Basis of Bids: Bids shall be based on the stated volume of rock excavation and off-site disposal of excavated material. INCLUDE THE ROCK EXCAVATION UNIT PRICES IN THE BASE BID.

1. Refer to Unit Price Schedule following the Bid Form in Division 00.
2. Prices quoted include full compensation for labor, materials, tools, equipment and other necessary items for excavation and disposal of rock.
3. Unit prices shall apply in the event additions to or deductions from the Work are required and authorized by Engineer.

C. Basis of Payment: Notify Engineer with sufficient time in advance of starting excavation in order that cross sections of original ground may be taken. Any time material is encountered which, in the opinion of Contractor should be classed as rock, notify Geotechnical Engineer so he may classify material properly and take required cross sections. Classification and pertinent elevations are as determined by Geotechnical Engineer. Cost for 3rd party Certified Testing

Agency and quantification of rock shall be the cost of the contractor.

1. Excavated Materials: Measure in their original positions. Compute volumes by the average end area method rounding off to nearest whole cubic yard.

2. Payment will be made based on the actual volume of material excavated as determined by Certified Testing Agency.

3. General Contractor shall provide certification from Testing Agency as to the net volume of rock actually excavated and disposed of in comparison to stated volume.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, Groups A-1, A-2-4, A-2-5, and A-3 according to AASHTO M 145, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7 according to AASHTO M 145, or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 294/D 2940M 0; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

1. Reference Section 321123

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and zero to 5 percent passing a No. 8 sieve.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored to comply with local practice or requirements of authorities having jurisdiction.

B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored to comply with local practice or requirements of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.

B. Protect and maintain erosion and sedimentation controls during earth-moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Pile Foundations: Stop excavations 6 to 12 inches above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.

3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.5 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 12 inches each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
3. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.6 SUBGRADE INSPECTION

A. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

3.7 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Engineer.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Engineer.

3.8 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.9 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Section 033000 "Cast-in-Place Concrete."

D. Trenches under Roadways: Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in Section 033000 "Cast-in-Place Concrete."

E. Initial Backfill: Place and compact initial backfill of subbase material or satisfactory soil, free of particles larger than 1 inch any dimension, to a height of 12 inches over the pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

F. Final Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.

G. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under building slabs, use engineered fill.
5. Under footings and foundations, use engineered fill.

3.11 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698/ASTM D 1557:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.13 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.
3. Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.14 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:

1. Shape subbase course and base course to required crown elevations and cross-slope grades.
2. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
3. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698/ASTM D 1557.

3.15 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches.
2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.16 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform inspections:

B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Engineer.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.17 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

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SECTION 31 21 16

TRENCHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Excavating trenches for piped utilities.

B. Related Sections:

   1. Section 312000 – Earth Moving: For backfilling and compaction of utility trenches.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:
   1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:
   1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
   2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
   3. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
   4. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft3 (2,700 kN-m/m3)).
   5. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
   6. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
   7. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, or cable.

1.4 SUBMITTALS

A. Section 013300 –Submittal procedures.

B. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with all applicable codes, and City of Birdeye Ordinances.

1.6 QUALIFICATIONS

A. Prepare excavation protection plan under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Arkansas.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.8 COORDINATION

A. Section 013300 – Submittal Procedures

B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 - PRODUCTS

Not used

PART 3 - EXECUTION

3.1 LINES AND GRADES

A. Lay pipes to lines and grades indicated on Drawings.
   1. Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

B. Use laser-beam instrument with qualified operator to establish lines and grades.

3.2 PREPARATION

A. Call “One Call”, the local utility information service at 811 not less than three (3) working days before performing Work.
   1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum locations.

C. Protect plant life, lawns, and other features remaining as portion of final landscaping.

D. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

E. Maintain and protect above and below grade utilities indicated to remain.

F. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

3.3 TRENCHING

A. Excavate subsoil required for utilities to utility service.

B. Remove lumped subsoil, boulders, and rock up of 1/6 of a cubic yard measured by volume. Remove larger material as specified in Section 312000 as rock excavation.

C. Perform excavation within 24 inches of existing utility service and in accordance with utility's requirements.

D. Do not advance open trench more than 200 feet ahead of installed pipe.

E. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.

F. Excavate bottom of trenches maximum 2 feet wider than outside diameter of pipe.

G. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and pipe utilities.

H. Do not interfere with 45 degree bearing splay of foundations.

I. When Project conditions permit, slope side walls of excavation starting 2 feet above top of pipe. When side walls cannot be sloped, provide sheeting and shoring to protect excavation as specified in this section.

J. When subsurface materials at bottom of trench are loose or soft, [excavate to greater depth as directed by notify Engineer, and request instructions.]

K. Cut out soft areas of subgrade not capable of compaction in place. Backfill with satisfactory fill material, Earthwork and compact to density equal to or greater than requirements for subsequent backfill material.

L. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.

M. Correct over excavated areas with compacted backfill as specified for authorized excavation or replace with satisfactory fill as directed by Engineer.

N. Remove excess subsoil not intended for reuse, from site.

3.4 SHEETING AND SHORING

A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

B. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.

C. Design sheeting and shoring to be removed at completion of excavation work.

D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.

E. Repair damage to [new] [and] [existing] Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.5 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen fill materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Refer to Drawings for backfill procedure and materials for various pipe types.

D. Employ placement method that does not disturb or damage utilities in trench.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Do not leave more than 50 feet of trench open at end of working day.

G. Protect open trench to prevent danger to the public.

3.6 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: Allow testing service to inspect and approve each subgrade and fill layer before further backfill or construction work is performed. Basis of acceptance shall include but not be limited to compacted density performed as specified herein.

1. Perform field density tests in accordance with ASTM D 1556 (sand cone method), ASTM D 2167 (rubber balloon method) or ASTM D 2922 (nuclear gage method).

B. If in the opinion of the Engineer, based on testing service reports and inspection, subgrade or fills that have been placed are below specified density, Contractor shall perform additional compaction and testing, at his expense, until specified density is obtained.

3.7 PROTECTION OF FINISHED WORK

A. Reshape and re-compact fills subjected to vehicular traffic during construction.

END OF SECTION

SE**CTION 31 22 00**

SITE GRADING

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Rough grading the site.

1.2 RELATED SECTIONS

A. Section 311000 - Site Clearing.

B. Section 312000 – Fill and Backfill: Filling and compaction.

C. Section 329300 - Exterior Plants.

1.3 SUBMITTALS

A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.4 PROJECT CONDITIONS

A. Protect above- and below-grade utilities that remain.

B. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from grading equipment and vehicular traffic.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Topsoil: See Section 329300.

B. Other Fill Materials: See Section 312000

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

3.2 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities.

C. Locate, identify, and protect utilities that remain, from damage.

D. Notify utility company to remove and relocate utilities.

3.3 ROUGH GRADING

A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.

B. Do not remove topsoil when wet.

C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.

D. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.

E. When excavating through roots, perform work by hand and cut roots with sharp axe.

F. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

3.4 FINISH GRADING

A. Before Finish Grading:
   1. Verify building and trench backfilling have been inspected.
   2. Verify subgrade has been contoured and compacted.

B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.

C. Where topsoil is to be placed, scarify surface to depth of 3 inches.

D. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches.

E. Place topsoil in areas indicated.

F. Place specified planting mix as follows:
   1. Shrub Beds: 8 inches.
   2. Flower Beds: 8 inches.
   3. Sodded areas: 3 inches

G. Place topsoil during dry weather.

H. Remove roots, weeds, rocks, and foreign material while spreading.

I. Near plants spread topsoil manually to prevent damage.

J. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.

K. Lightly compact placed topsoil.

3.5 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 1/10 foot from required elevation.

B. Top Surface of Finish Grade: Plus or minus 1/2 inch.

3.6 FIELD QUALITY CONTROL

A. See Section 312000 for compaction density testing.

3.7 CLEANING AND PROTECTION

A. Leave site clean and raked, ready to receive landscaping.

END OF SECTION

SECTION 32 11 23

AGGREGATE BASE COURSE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Aggregate base course for Portland cement or asphalt concrete paving.

1.2 RELATED SECTIONS

A. Section 312000, Earth Moving

B. Section 321216, Asphalt Pavement

1.3 REFERENCES

A. ASTM D698 – Test Methods for Moisture – Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.

B. ASTM D1557 – Test Methods for Moisture – Density Relations of Soils and Soil-Aggregate Mixtures Using 10lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

C. ASTM D2167 – Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

D. ASTM D6938 - 10 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

PART 2 – PRODUCTS

2.1 MATERIALS

A. Class 7 Base Course: Crushed stone base material with the following gradation:

SIEVE (mm)	Class 7 Percent Passing
3" (75)	-
2" (50)	-
1½" (37.5)	100
1" (25.0)	60-100
3/4" (19.0)	50-90
3/8" (9.5)	-
#4 (4.75)	25-55
#10 (2.00)	-
#40 (0.425)	10-30
#200 (0.075)	3-10

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.2 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place fill on soft, muddy, or frozen surfaces.

3.3 AGGREGATE PLACEMENT

A. Spread aggregate over prepared substrate to a maximum compacted thickness of 6 inches per lift.

B. Level and contour surfaces to elevations and gradients indicated.

C. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

D. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.4 TOLERANCES

A. Flatness: Maximum variation of ¼ inch measured with 10 foot (3 m) straight edge.

B. Scheduled Compacted Thickness: Within ¼ inch.

C. Variation From Design Elevation: Within ½ inch.

3.5 FIELD QUALITY CONTROL

A. Compaction testing will be performed in accordance with ASTM D1557 and ASTM D6938, as indicated.

B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.

C. Frequency of Tests: One per lift per 2,500 square feet or as otherwise recommended by the Geotechnical Engineer.

END OF SECTION

SECTION 32 12 16

ASPHALT PAVEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Hot-mix asphalt paving.

B. Related Sections:

   1. Section 321123 - Aggregate Base Course, for aggregate subbase and base courses.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

   1. Job-Mix Designs: For each job mix proposed for the Work.

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each paving material, from manufacturer.

1.4 QUALITY ASSURANCE:

A. Allowable Tolerances:

   1. Subgrade after fine grading:

      a. Shall not vary more than 0.05 feet from plan elevation.

   2. Aggregate base:

      a. Shall not vary more than 0.05 feet from plan elevation.

   3. Asphalt concrete hot mix binder course:

      a. Shall not vary more than 0.04 feet from the plan elevation.

      b. Shall not vary more than 0.04 feet from specified thickness.

   4. Asphalt concrete hot mix wearing course:

      a. Shall not vary more than 0.03 feet from the plan elevation.

      b. Shall not vary more than 0.02 feet from specified thickness.

c. Shall not vary more than 0.015 feet from the edge of a 10 foot straight edge laid thereon parallel to or at right angles to the direction of paving.

5. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

B. Test and Design Mix Criteria:

1. Contractor, at his expense, shall employ the services of an independent testing laboratory to perform tests and design mixes. Materials and mix designs shall be approved at least 10 days before starting of construction.

a. Aggregate tests (Aggregate Base Course):

1. The material to be used for the aggregate base course shall conform to Section 321123, Aggregate Base Course.

b. Preliminary job mix formula (Asphalt Concrete Hot Mix Surfacing):

1. A preliminary job mix formula shall be developed for the asphalt concrete hot mix surfacing material in accordance with AASHTO MP 2.

2. Resubmit a new job mix formula for OWNER'S approval if it becomes necessary to change the source of aggregates or when unsatisfactory results or other conditions warrant a change in mixture requirements.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:

1. Tack Coat: Minimum surface temperature of 60 deg F
2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
3. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. Coarse Aggregate: ASTM D 692, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.

B. Fine Aggregate: AASHTO M 29, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.

C. Mineral Filler: AASHTO M 17, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

A. Asphalt Bitumen for Binder Course and Surface Course: AASHTO M 320, **PG 76-22**

B. Bituminous Tack Coat: CSS-1, CSS-1h, RC-70, MC-250, or OWNER approved equal.

2.3 MIXES

A. Hot-Mix Asphalt: Each mix design shall be prepared by laboratory analysis. Each mix design will establish a mix gradation for the aggregates (based on the weight of material passing specified screen sizes), an optimum asphalt binder content (expressed as a percentage of the total mix weight), an optimum laboratory mixing temperature, and an optimum laboratory compaction temperature. Optimum laboratory mixing and compaction temperatures shall be established based on temperature-viscosity curves of the asphalt binder to be used in the mix. The optimum asphalt content is the asphalt binder content at 4% Air Voids (AV) for PG 76-22 mixes and 4.5% Air Voids (AV) for PG 64-22 and PG 70-22 mixes. The mix design will be designed in accordance with the volumetric mix design procedures contained in AASHTO MP 2 and its referenced standards.

PART 3 - EXECUTION

3.1 SUBGRADE PREPARATION

A. Fine grade and compact subgrade to the plan cross section. Compaction shall be as specified in Section 312000.

B. After compaction, cut-out soft spots and unstable areas in the subgrade and fill with granular fill as defined in Section 312000 and compact as specified in Section 312000.

3.2 AGGREGATE BASE

A. Where required, construct the aggregate base as shown on Drawings on the prepared subgrade as soon as possible after final shaping and compaction of the subgrade is completed.

B. Construction requirements shall be compacted to a density of at least 98 percent as defined by ASTM D1557 (Modified Proctor).

C. Density tests shall be taken as specified in Section 312000 and no bituminous layer shall be applied on the aggregate base course until it is approved by OWNER.

3.3 BITUMINOUS TACK COAT

A. Apply a bituminous tack coat to an existing bituminous surface if it has been dirtied by traffic or by other means just before constructing another bituminous course. The face of all concrete surfaces to which the bituminous surface will come in contact with shall be sprayed or painted with tack oil.

3.4 BITUMINOUS BINDER COURSE

A. Construct a plant mixed bituminous binder course as shown on Drawings using a mechanical paver.

3.5 BITUMINOUS WEARING COURSE

A. Construct a plant mixed bituminous wearing course as shown on Drawings using a mechanical paver.

3.6 FIELD QUALITY CONTROL

A. From time to time during progress of the work and/or upon completion of the work, OWNER may require that testing be performed to determine that materials provided for the work and its installation meet the specified requirements.

3.7 DEFECTIVE WORK

A. When tests and inspections of the aggregate base and/or bituminous work indicate non-compliance with the Specification, Contractor and OWNER shall mutually agree on the number and location of additional tests to define and/or verify the deficiency. If the average of the tests for a given area indicate non-compliance, the area is considered defective and Contractor shall:

1. Remove and replace defective work at no cost to OWNER;

2. Correct the work at no cost to OWNER in a manner acceptable to OWNER; or

3. Give OWNER a credit towards the Contract Price if said credit is acceptable to OWNER.

3.8 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
3. Offset transverse joints, in successive courses, a minimum of 24 inches.
4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

3.9 COMPACTION

B. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F.

C. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated

crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

D. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.

E. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

F. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.10 FIELD QUALITY CONTROL

I. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

J. Replace and compact hot-mix asphalt where core tests were taken.

END OF SECTION

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SECTION 32 13 14

CONCRETE PLAZA, WALKS AND PAVING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Provide concrete plazas, walks, steps and paving as shown and specified. The work includes:

1. Final subgrade preparation and paving base.
2. Plazas, curbs, walks, and pedestrian paving.

B. Related work:

1. SECTION 311000: - Site Clearing.

2. SECTION 033000: - Cast-In-Place Concrete

1.2 QUALITY ASSURANCE

A. Comply with General Condition requirements.
B. Testing and inspection: Performed by a qualified independent testing laboratory.
C. Provide and pay for testing and inspection during concrete operations. Laboratory shall be acceptable to the Owner.
D. Materials and methods of construction shall comply with the following standards:

1. American Society for Testing and Materials, (ASTM).

2. American Concrete Institute, (ACI).

E. Maintain field records of time, date of placing, curing, and removal of forms of concrete in each portion of work.
F. Do not change source or brands of cement and aggregate materials during the course of the work.

G. Sample panel: Before installing concrete plaza and concrete walk work, provide sample panels, minimum 20 SF for each different type, using specified materials. Show color, texture, finish, saw cut joints, pattern, edging, and expansion joint treatments. Correct and rebuild sample panel until Landscape Architect's acceptance of the work. Retain panel during construction as a standard for completed concrete work. Panel must be inside the construction fence but outside the plaza area. Sample panel must be removed by contractor after project is complete and the restored to pre-construction condition.

1. The approved sample panel may not be a portion of the work. Location as directed by the Landscape Architect.

2. Provide a sample panel for each type of concrete work required.

1.3 SUBMITTALS

A. Submit concrete mix designs. Obtain approval before placing concrete.

B. Product data:

1. Submit complete materials list of items proposed for the work. Identify materials source.
2. Submit admixture, curing compound, retarder, and accessory item product data.
3. Submit material certificates for aggregates, reinforcing, and joint fillers.

C. Submit concrete delivery tickets. Show the following:

1. Batch number.
2. Mix by class or sack content with maximum size aggregate.
3. Admixtures.
4. Air content.
5. Slump.
6. Time of loading.

D. Submit concrete test reports.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver curing materials, admixtures, and retarders in manufacturer's standard unopened containers with labels legible and intact. Store and protect from freezing and damage.

1.5 PROJECT CONDITIONS

A. Work notification: Notify Landscape Architect at least 24 hours prior to installation of concrete.
B. Establish and maintain required lines and grade elevations.
C. Do not install concrete work over wet, saturated, muddy, or frozen subgrade.
D. Do not install concrete when air temperature is below 40 degrees F. Use of calcium chloride, salt, or any other admixture to prevent concrete from freezing is prohibited.
E. Protect adjacent work.
F. Provide temporary barricades and warning lights as required for protection of project work and public safety.

PART 2 PRODUCT

2.1 MATERIALS

A. Portland cement: ASTM C150, Type 1, natural color.
B. Aggregate: Provide AASHTO M43 Grading #57 clean, uncoated crushed stone or gravel coarse aggregate free of materials which cause staining or rust spots; fine aggregate shall be clean natural sand.
C. Water: Clean, fresh, and potable.
D. Air entraining admixture: ASTM C260.
E. Water reducing admixture: ASTM C494.
F. Chromix Admixtures for colored – conditioned concrete and color stained concrete by Scofield. Designer colors to be #5178 Stetson Buff.

2.2 MIXES

A. Provide ASTM C94 ready-mixed concrete. Batch mixing at site not acceptable.

1. Strength: 4,000 psi minimum at 28 days.

2. Slump range: 2" to 4" maximum.

B. Provide an approved water reducing admixture in all concrete.

C. Provide an air entraining admixture in all concrete. Air content 5% to 7%.

D. Indicate water added to mix at job site on each delivery ticket. Show quantity of water added. Site water tempered mixes exceeding specified slump range will be rejected as not complying with specification requirements.

2.3 ACCESSORIES

A. Granular base: AASHTO M43, #6 (3/8" to 3/4") uniformly graded, clean crushed stone or gravel.

B. Forms: Wood or metal of sufficient strength to resist concrete placement pressure and to maintain horizontal and vertical alignment during concrete placement. Provide forms straight, free of defects and distortion, and height equal to full depth of concrete work.

1. Provide 2" nominal thickness, surfaced plank wood forms for straight sections. Use flexible metal, 1" lumber or plywood forms to form radius bends.

C. Joint filler: ASTM D1751 and FS HH-F-341, Type 1, molded non-extruding asphalt impregnated fiberboard, thickness indicated.

D. Curing compound: ASTM C309, non-yellowing, nonstaining liquid membrane forming type containing a fugitive dye. Chlorinated rubber compounds not acceptable for exterior use. Coordinate use of curing compound with Scofield to protect color.

F. Joint sealants: Two component polysulfide or polyurethane self leveling, designed for foot traffic. Color to match adjacent concrete color.

G. Weld wire fabric: ASTM A185, welded plain cold drawn steel wire fabric, 6" x 6" - 10 x 10, or as indicated. Furnish in flat sheets.

H. Form release agent: Nonstaining chemical form release agent free of oils, waxes, and other materials harmful to concrete.

I. Joint Dowel Bars: Plain steel bars, ASTM A615, Grade 40. Cut bars true length with end square and free of burrs. Furnish metal expansion caps for one end of each dowel in expansion joints. Design caps with one end closed and a minimum length of 3" to allow bar movement of not less than 1", unless otherwise indicated.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine subgrades and installation conditions. Do not start concrete work until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Proof roll the subgrade and do all necessary rolling and compacting to obtain firm, even subgrade surface. Fill and consolidate depressed areas. Remove noncompacting materials, replace with granular base and compact to 100% of the maximum dry density in accordance with ASTM D698 Standard Proctor Method.

B. Provide compacted granular base material at plazas and walks as indicated on plans. Compact granular base to 98% of the maximum dry density in accordance with ASTM D698 Standard

Proctor Method.

C. Remove loose material and debris from base surface before placing concrete.

D. Install, align, and level forms. Stake and brace forms in place. Maintain following grade and alignment tolerances:

1. Top of form: Maximum 1/8" in 10'-0".

2. Vertical face: Maximum 1/4" in 10'-0".

E. Coat form surfaces in contact with concrete with form release agent as necessary to assure separation from concrete without damage.

F. Locate, place, and support reinforcement as indicated.

1. Provide a single layer of welded wire fabric in all subgrade concrete slabs on grade.

2. Provide reinforcing bars as shown on plans for plaza and other locations indicated, adequately secured to prevent displacement.

G. Install, set, and build in work furnished under other specification sections. Provide adequate notification for installation of necessary items.

H. Install pipe sleeves for irrigation system as indicated on plans or as directed by Landscape Architect. Stake location of irrigation sleeves.

3.3 INSTALLATION

A. Concrete placement:

1. Comply with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete", and as specified.

2. Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placing, and curing. In cold weather comply with ACI 306, "Recommended Practice for Cold Weather Concreting". In hot weather comply with ACI 305, "Recommended Practice for Hot Weather Concreting".

3. Moisten base to provide a uniform dampened condition at the time concrete is placed. Verify manholes or other structures are at required finish elevation and alignment before placing concrete.

4. Place and spread concrete to the full depth of the forms. Use only square ended shovels or concrete rakes for hand spreading and consolidating concrete. Exercise care during spreading and consolidating operations to prevent segregation of aggregate and dislocation of reinforcement.

5. Place concrete in a continuous operation between expansion joints. Provide construction joints when sections cannot be placed continuously.

6. Place concrete in one course, monolithic construction, for the full width and depth of concrete work.

7. Strike off and bull float concrete after consolidating. Level ridges and fill voids. Check surface with a 10'-0" straightedge. Fill depressions and refloat repaired areas. Darby the

concrete surface to provide a smooth level surface ready for finishing.

8. Match existing curb profiles as required.

9. Provide curb profiles indicated.

10. Provide handicapped ramps where indicated.

11. Provide concrete base for patching and repairing existing street paving damaged or removed to accommodate new curbs, walks, and handicapped ramp paving, and entrance apron paving.

B. Joints:

1. Construct control, expansion, and construction joints properly aligned with face perpendicular to concrete surface.

2. Provide saw cut and tooled control joints, sectioning concrete into areas indicated. Saw cut and tool joints to depth equal to not less than one fifth (1/5) of the concrete thickness. Saw cut control joints in pattern and at spacing indicated (review layout with Landscape Architect). When not indicated, provide spacing equal to slab width and not greater than 10'-0" on center.

3. Provide standard keyed section construction joints where indicated.

4. Provide expansion joints using molded joint filler at concrete work abutting curbs, walls, structures, walks, and other fixed objects.

   a. Locate expansion joints as indicated. When not indicated, provide joints at maximum 20'-0" on center for curbs and walks. Align expansion joints in abutting curbs and walks.
   b. Install joint fillers full width and depth of joint. Recess top edge below finished where joint sealants are indicated.

   c. Protect the top edge of the joint filler during concrete placement.

C. Concrete finishing:

1. Perform concrete finishing for salt finish, sand blasting and broom finish as indicated on plans using mechanical or hand methods as required.

2. Upon completion of floating, and after bleed water has disappeared and concrete can sustain foot pressure with nominal indentation, cut concrete away from forms. Work edges with an edging tool. Round edges to 1/4" radius.

3. Install control joints at indicated locations during edging operations.

4. Complete surface finish as follows:

a. Provide plaza, sidewalk, steps, concrete bands and pavement surfaces with a combination of medium broom finish and or color stained finish as indicated on the plans.

b. Provide ramps with nonslip heavy broom textured finish.

c. Curbs: Provide a smooth float finish.

D. Curing:

1. Cure concrete with a nonstaining liquid membrane forming compound. Spray apply in accordance with manufacturer's recommended coverage rate. Apply curing compound immediately after completing surface finish. Coordinate with manufacturer regarding the use of curing compound on stained and/or colored concrete.

E. Joint sealants:

1. Install joint sealants where indicated in accordance with manufacturer's installation instructions. Clean and prime joints. Remove dirt and loose coatings.

2. Apply sealants in continuous beads, without open joints, voids, or air pockets. Hand tool and finish all joints.

3. Confine materials to joint areas with masking tape or other precautions.

4. Remove excess compound promptly as work progresses and clean adjoining surfaces.

5. Joint sealants must match color of adjacent concrete, review with Landscape Architect prior to installing.

3.4 FIELD QUALITY CONTROL

A. Provide field quality control testing and inspection during concrete operations.
B. Contractor shall provide adequate notice, cooperate with, provide access to the work, obtain samples, and assist test agency and their representative in execution of their function.
C. Testing: (Paid for by Contractor)

1. Provide slump test on first load of concrete delivered each day and whenever requested due to changes in consistency or appearance of concrete.

2. Provide air indicator tests and air meter tests for all air entrained concrete.

a. Perform air indicator test with a "Chase" AE 35 or equal air indicator, and air meter test in accordance with ASTM C231 or C173. Test first load of concrete delivered each day.

b. Furnish copies of field records and tests reports as listed for strength tests.

3. Strength testing:

a. Provide 1 set of 3 test specimens for each 50 cubic. yard. placed in any one day. Secure samples in accordance with ASTM C172 and mold specimens in accordance with ASTM C31.

b. Test 1 specimen at 7 days and 2 specimens at 28 days in accordance with ASTM C39.

c. Furnish copies of field records and test reports as follows:

2 copies to Landscape Architect

1 copy to Contractor

1 copy to ready mix supplier

4. Record the exact location of the concrete in the work represented by each set of cylinders and show on test reports.

5. Provide an insulated moist box for protection of the test cylinders until shipped to the laboratory.

3.5 PROTECTION

A. Protect concrete work from damage due to construction and vehicular traffic until final acceptance. Exclude construction and vehicular traffic from concrete pavements for at least 14 days.

3.6 CLEANING

A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, debris, and equipment. Repair damage resulting from concrete operations.

B. Sweep concrete sidewalks and pavement, wash free of stains, discoloration, dirt, and other foreign material immediately prior to final acceptance.

END OF SECTION

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SECTION 328400

PLANTING IRRIGATION

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PLANTING IRRIGATION
SECTION 328400

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. General provisions of the contract and other applicable parts of the construction documents apply to this Section.

1.2 SUMMARY:

A. Furnish all labor, materials, equipment and instructions necessary for the complete installation of the landscape irrigation system as drawn and specified. The work includes, but is not limited to:
   1. Installation of PVC Sleeves -or- Bore for Access as required.
   2. Trenching, backfilling, and compaction for irrigation lines.
   3. Provisions and installation for a turnkey automatic sprinkler system. Provide, Satellite Controllers compatible with existing Central Computer Control System, Sleeving, Piping, Valves, Quick Couplers, Valve Access Boxes, Low Voltage Wiring, Sprinkler Heads, applicable fees and all other items required for a complete system as shown on the Drawings, called for in the specifications or as may be required for proper operation of the system. The system shall be installed in strict accordance with all applicable codes, ordinances and regulations and the manufactures recommendations.
   4. As part of the work related to the existing irrigation Pump System, provide telemetry equipment necessary for automating the operation, utilizing the existing Central Computer Control System, to control water level in the existing storage pond. Communication will be via Wireless Radio Kit & necessary telemetry equipment / antennas required to achieve reliable signal.
   5. Test all systems, make operative and adjust.
   7. Submit Record Drawings and Maintenance Manual.
   8. Maintain and operate until substantial completion.
   9. One-year Guarantee Period.

B. Related work:
   1. Electrical work and Conduits for (2) new Satellite Controllers and (1) existing Satellite Controller (115V, 1Phase).

C. Provide 12” pop up spray heads in all shrub and groundcover beds unless otherwise designated. Provide 4” pop up spray heads in small turf areas or in clusters of trees where impact heads are not feasible. Provide rotary spray heads in large turf expanses and as shown. Provide the number of heads required to assure 100% coverage. Lay out the system so that the shrub and groundcover beds are on separate zones from the turf areas

D. Provide winterizing for the system by air blowout method using quick coupler valves as indicated on the Drawings and Manual Drain Valves in the Low Points of the Mainline Piping.

E. Coordinate exact locations of Existing Irrigation Components including Pump Station, Central Computer Control System, Satellite Controllers and sensors with the Landscape Architect & owner.

F. The Contractor shall coordinate the installation of the sprinkler system with the landscape installation, avoiding the rootballs of trees and shrubs.

G. The Contractor shall install the irrigation system in accordance with the schedule requirements of the Owner.

1.3 QUALITY CONTROL:

A. To the greatest extent possible, provide system components produced by a single manufacturer. Provide secondary materials as recommended by the primary system manufacturer.

B. The sprinkler system shall be designed, to the extent possible, to promote water, soil and energy conservation.

C. Contractor shall be skilled in work required and completely familiar with manufacturer's recommended method of installation requirements. Contractor must have experience in this area of work and having completely installed other jobs of similar size and scope. Contractor must have completed Hardware and Software Training for the Central Computer Control System -or- he shall utilize the Manufacturer's Technical Services Division for Programming the Central Controller at his expense. Evidence of the Contractor's qualifications shall be presented before the award of contract.

D. Approval and selection of Materials and Work: The selection of all materials and the execution of all operations required under the Contract Documents shall be subject to the approval of the Owner or Owner's Representative who shall have the right to reject any and all materials and any and all work which, in their opinion, does not meet the requirements of the Contract Documents at any stage of the operations. All rejected materials shall be removed from the site by the Contractor.

E. The successful Contractor shall maintain a competent, skilled and satisfactory work force during and through the completion of the construction period. In no case, shall unskilled labor be allowed to operate equipment, assemble, glue, install, wire, test or adjust components of the system. If in the opinion of the Owner or Owner's Representative, the labor furnished by the Contractor is incompetent or inexperienced in the practice assigned, the Contractor shall remove such persons or reassign them to a practice acceptable to the Owner or Owner's Representative.

F. Conform to all codes, statutes, laws and regulations governed by the following agencies for the protection of public safety:

ASTM	American Society for Testing Materials
AWWA	American Water Works Association
NEC	National Electric Code
NSF	National Sanitary Foundation
OSHA	Occupational Safety and Health Act
UPC	Uniform Plumbing Code

G. The Contractor shall make application, acquire, comply and pay for all licenses and/or permits required by Local, State, or National Governing Agencies as may be required to perform and complete the work as described in the Contract Documents.

1.4 SUBMITTALS:

A. General: Make all submittals far enough in advance of scheduled dates of installation to provide all required time for reviews, for possible revisions, and resubmittals, and for placing orders and securing delivery.

B. A design layout based on the equipment of Rainbird Sprinkler Corporation has been provided for bidding purposes. Substitutions of equipment with equal quality and performance may be submitted for approval from Hunter Industries or The Toro Company. Full and complete coverage is required. Contractor shall make any necessary minor adjustments to the layout as required to achieve full coverage of irrigated area at no additional cost to the Owner. It shall be the contractor's responsibility to establish the location of all sprinkler heads in order to ensure proper coverage of all areas.

C. Product Manual: Submit technical specification sheets and or performance data for all proposed system components. Submit the address and telephone number of the Contractor and the local representative for the equipment.

1.5 PROJECT CONDITIONS:

A. The Contractor shall warrant that he has fully informed himself of the site conditions under which the work will be performed and is thoroughly familiar with the Contract Documents and all applicable codes and standards. Failure to have done so will not relieve the Contractor of his obligation to furnish all supervision, labor, tools, materials, equipment and supplies necessary to perform the provisions of the work detailed in the Contract Documents.

B. Make necessary adjustments in the layouts as may be required to connect to existing stub-outs, should such not be located exactly as shown, and as may be required to work around existing work at no increase in cost to the Owner.

C. The Contractor’s attention is directed to the fact that there are other utilities located within the limits of the work. Before commencing any work required under the Contract, he shall determine the location of all utilities, subsurface drainage, structures and underground construction so that proper precaution may be taken not to disturb or damage during all operations. The Contractor shall be held responsible for making, at his own expense, all repairs to damaged utilities which could have been located or other construction resulting from the work covered by this Contract.

D. Should utilities not shown on plans be found during excavations, promptly notify the Owner or Owner’s Representative for instructions as to further action.

E. Do not interrupt existing services without Owner’s approval. Schedule interruptions in advance, according to Owner’s instructions. Interruptions shall be scheduled at such times of day and work so that they have minimal impact on Owner’s operations.

F. Existing Locations of Irrigation System Mainline Piping, Valves, Controls, etc… are shown schematically. Plans from previous phases of work were used to show approximate locations. Field Verify routing of existing Irrigation System and make necessary adjustments to the Layout as may be required to Re-Connect to existing pipes and wires, that is to Remain, at No Increase in Cost to the Owner.

G. Prior to installation, operate the existing irrigation zones to determine functionality. Locate and protect existing mainline piping, automatic control valves and valve wires within the work area that is to Remain. If damaged during demolition or construction, make repairs immediately and note location of such on the as-built drawings. Re-Connect existing system mainline, lateral piping and valve wires if such areas are divided by new construction. All wire splices shall be covered with a valve box. Supply and install new sprinklers that are damaged in areas adjacent to the new construction to provide consistent coverage.

H. Prior to Contractor beginning work, the Owner shall be given 7 days notice to salvage any existing sprinklers, valves, valve boxes and controllers, in areas of new construction, that he thinks may be reused for future repairs / maintenance.

I. The Contractor shall be responsible for legally disposing of all trash and debris as well as existing irrigation pipe & equipment that is demolished during excavation. All remaining irrigation components in areas of new construction that are visible at or above grade shall be removed and disposed of off-site. Existing Irrigation piping & wiring below grade in areas of new construction shall be disconnected and abandoned in place.

J. Flag the location of all sprinklers in accordance with the approved design and submittals. In the event of a discrepancy, immediately notify the Owner or Owner's Representative. Do not proceed with installation in areas of discrepancies until all such discrepancies have been fully resolved.

K. **For irrigation work within existing Burial Sections, stay inside "Utility Access Isles". Locate existing Control Markers centered in Access Isles and offset Irrigation Trenches 24" from those locations. Flag the location of all sprinklers AND use Blue Paint to mark exact routing of trenches. Have owner inspect and approve trench routing prior to excavating in those areas.**

L. The Contractor shall assume full responsibility for all intentional and unintentional disturbance or damage to the site by all parties, employees, contract workers, or sub-contractors involved under the authority or interest of the Contractor. The Owner shall be the sole and final authority of the acceptability of all restoration of aesthetically sensitive areas. The public or private authority or agency responsible for ecological or environmentally sensitive areas shall be the final authority as to the acceptability of restoration work within such areas. All fines, penalties, and restoration expense of any such disturbance shall be the sole responsibility of the Contractor.

1.6 PROTECTION OF WORK AND MATERIALS:

A. Use all means necessary to protect the work before, during and after installation and to protect the materials and installed work of all other trades.

B. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner or Owner's Representative at no additional cost to the Owner.

C. Store materials delivered to site, prior to actual use, in a secure place not to interfere with other trades or construction and protect from vandalism, damage by weather or other elements.

1.7 ACCIDENT REACTION:

A. In the event of an accident causing injury or damage, the Contractor shall promptly report such to the Owner, Owner's Representative, and required governmental agencies.

PART 2 - PRODUCTS

2.1 GENERAL:

A. The sprinkler system shall be installed using the approved equipment of:
Rainbird Sprinkler Corporation or Approved Equal Only.

B. Materials shall be newly manufactured and without flaws or defects, and of quality and performance as specified. Excess materials at completion are property of the Contractor, to be removed from the site.

C. The Contractor shall be responsible for computing and supplying the required quantities necessary to make the irrigation system complete and operational in every way. Quantities shown on the drawings are for convenience only.

2.2 PIPE AND FITTINGS:

A. Mainline piping below ground shall be polyvinyl chloride (PVC) pipe; meeting ASTM D2241, Class 200, Ring-Type Gasket Joint connections.

B. **Mainline fittings (bends and tees) below ground shall be Ductile Cast Iron with Ring-Type Gasket Joint connections.**

C. Lateral piping below ground shall be polyvinyl chloride (PVC) pipe; meeting ASTM D2241, Class 200 for solvent weld connections; Sch40 for threaded connections. The minimum pipe size shall be 3/4" in diameter for spray head and small rotor zones, 1” for large rotor zones.

D. Lateral fittings below ground shall be polyvinyl chloride (PVC) fittings; meeting ASTM D2466, Sch40 for solvent weld connections; Sch40 for threaded connections. All fittings must be of domestic manufacture and shall be identified as to pressure rating or schedule, with a working pressure no lower than that of the pipe.

E. Handling of Pipe and PVC Fittings: Exercise care in handling, loading, unloading and storing PVC pipe and fittings. Store under cover and transport in a vehicle with a bed long enough to allow no undue bending or concentrated external load at any point. Any section of pipe that has been dented or damaged will be discarded until said section of pipe is cut out and rejoined with a coupling.

F. Visual Inspection: Provide pipe homogenous throughout, free from visible cracks, holes, blisters, wrinkles or foreign materials

G. PVC solvent cement shall comply with ASTM D2564, regular-bodied for pipe 2" and smaller, and medium for pipe 2 1/2" and larger. Use only the solvent approved and/or recommended by the pipe manufacturer to make solvent welded joints.

H. Use Teflon tape or an appropriate sealant for all threaded connections.

2.3 CONTROL WIRES AND CONNECTORS:

A. Single Conductor Wire for direct burial applications between satellite controllers and zone valves, meeting UL Standard 493, UF-14/1 for "Control" wiring and UF-14/1 for "Common" wiring. Color code the common neutral wiring from all other wires.

B. Wire Connectors shall be either 3M DBY / DBR or King "One Step" Connectors or approved equal.

2.4 EXISTING CENTRAL CONTROL & SATELLITE CONTROLLERS:

A. All new Irrigation Control equipment shall be fully compatible with the **existing** Rainbird SiteControl Computer System installed in Visitors Center Office. Verify the exact location with the Owner and/or Architect. The **existing** Interface TWISATL shall serve as an interface between the central controller and field satellites on the SiteControl System.

Satellite controllers shall be the Rainbird **ESP-SAT-LS-LINK** Series using Radio communication.

B. A Site Survey shall be conducted to measure the strength of radio transmitted signals between the Central Control System to the new satellites and from the satellites back to the central. Adjust exact locations of satellites if necessary for improved signal strength with approval by Owner and/or Architect.

C. All Wiring, Wire Connections, Surge Protection and Grounding shall be in strict accordance with manufacturer's specifications.

2.5 VALVES:

A. The remote control valves shall be a normally closed, 24VAC solenoid actuated, globe type valve. Shall have a pressure rating for a minimum of 200psi. They shall have scrubber feature to prevent clogging and manual flow control stems for accurate regulation and/or shutoff of outlet flow. Equip control valves with pressure regulating modules, as required, to regulate downstream pressure as follows:

1. Spray heads 30psi at furthest sprinkler.
2. Rotary heads 40psi at furthest sprinkler.

B. The quick coupling valves shall be a one piece type, constructed of heavy cast brass. The self-closing cover shall be made of a durable, highly visible, rubber. The valve shall be opened and closed by a brass key of the same manufacturer having a 3/4" brass hose swivel permanently attached. Provide three (3) keys.

C. The automatic drain valves shall be a pressure activated type, capable of opening when system pressure drops below 2.5psi, and closing when system pressure reaches 5.5psi.

D. CAST IRON ISOLATION GATE VALVES: Resilient Wedge design. Valves shall be 200 psi CWP and USA manufactured valves to meet AWWA-C509. Body and bonnet are to be of cast iron alloy ASTM A-126 Class B. Valve to be epoxy coated inside and outside. Two upper o-ring stem seals. Sealed counter sunk body bonnet bolts providing no exposure of bonnet bolts. Stems to be stainless steel. Resilient rubber encapsulated wedge. Cast iron 2" square operating nut. Valve ends shall be IPS push-on joint. Provide two (2) "T" handles for opening and closing isolation valves.

2.6 VALVE BOXES:

A. Provide valve boxes for all remote control, isolation gate valves, air relief valves, manual drain valves, decoders and wire splices. Valve box shall have a twist locking cover with flush fit so as not to interfere with traffic or mowing machinery.

B. When installed over relief valve, isolation valve, or air valve use a Rainbird VB-10RND - 10" Round Box with twist lock cover. When installed over control valves use a Rainbird VB-STD - Standard Rectangular Box or approved equal.

2.7 SPRINKLER HEADS:

A. All heads shall perform to manufacturer's specifications concerning diameter of throw and flow rates at given pressures.

B. Provide 4" pop-up spray heads in small turf areas or in clusters of trees where rotary heads are not feasible. The sprinkler shall have a pressure regulating device to prevent high-pressure fogging to the spray pattern and a pressure activated wiper seal that will clean

debris from the pop-up stem as it retracts. Use matched precipitation rate nozzles that can be mixed with various arcs and radii on the same circuit.

C. Provide 12" pop-up spray heads in all shrub and groundcover beds. The sprinkler shall include a pressure regulating device to prevent high pressure fogging to the nozzle stream. The sprinkler shall have a pressure activated wiper seal that will clean debris from the pop-up stem as it retracts. Use matched precipitation rate nozzles that can be mixed with various arcs and radii on the same circuit.

C. Provide 4" pop-up rotary sprinklers in all large turf areas. The full or part circle sprinkler shall be a single stream, gear driven rotor with a rotating nozzle turret that is independent of the riser stem. The sprinkler shall have a pressure activated wiper seal that will clean debris from the pop-up stem as it retracts. Matched precipitation shall be obtained by the changing of nozzles.

D. Provide check valve feature, as required, to prevent low head drainage from sprinklers at lower elevations.

PART 3 - EXECUTION:

3.1 GENERAL:

A. Verify that the work of this section is installed in strict accordance with all applicable codes, regulations the design and the approved submittals. Contractor shall install all equipment as per manufacturer's current specifications and recommendations.

B. Coordinate the installation of the sprinkler system with the landscape installation, avoiding the rootballs of trees and shrubs, and parking, paving and site electrical plans. Verify existing and proposed locations of all site utilities (i.e. gas, water, electric, telephone, fiber optics) prior to any trenching and laying of pipe.

C. When sprinkler system work is to be installed close to or will interfere with the work of other trades, the Contractor shall assist in working out space conditions to permit all work to be installed satisfactorily at no additional cost to the owner.

D. Flag the location of all sprinklers in accordance with the approved design and submittals. In the event of a discrepancy, immediately notify the Owner or Owner’s Representative. Do not proceed with installation in areas of discrepancies until all such discrepancies have been fully resolved.

E. The Contractor is responsible for full and complete coverage of all irrigated areas and shall make any necessary minor adjustments at any time, at no additional cost to the Owner.

3.2 SLEEVING:

A. Contractor shall provide Sch40 PVC sleeving, buried at a minimum of 18” and maximum of 24” depth.

B. Upon completion of site filling and compaction operations, and prior to the construction of foundations, roadways, walks or other pavements or obstructions, the Contractor shall install sleeves in sufficient sizes to accommodate future irrigation piping and/or control wiring. Ends of sleeves shall extend 18 inches past the edges of all paving or construction. The ends of the sleeves shall be clearly marked for future use.

C. If part of an existing irrigation sleeve is damaged due to new construction, the entire Sleeve, Pipes and Wires inside shall be replaced. No re-connections are to be made below paved areas.

3.3 TRENCHING AND BACKFILLING:

A. Perform all excavation required for the installation of the work included under this Section, including shoring and bracing of earth banks to prevent cave in. Restore all surfaces and existing underground installations damaged or cut as a result of the excavations, to their original condition and in a manner approved by the Owner or Owner's Representative.

B. Excavate trenches to a depth of minimum pipe coverage plus six inches. Remove all lumber, rubbish and large rocks from the trenches. Provide a uniform bearing for the entire length of each pipe line to prevent uneven settlement. Make the width of the trench a minimum of 1 1/2 times the diameter of the piping but not less than 4 inches.

C. Upon completion of pipe installation and system testing, backfill the trenches with clean soil. Backfill material shall be free from rocks or any heavy unsuitable substances which could damage the pipe or create unusual settling problems. Backfilling shall be done in six inch layers and tamped down after each layer is put back as required to avoid settling in landscape areas and to 98% standard proctor in paved areas.

D. If settling occurs within the warranted period, the Contractor shall be responsible for bringing the trenches up to finish grade and repairing plant damage without additional compensation.

3.4 PIPE INSTALLATION

A. Install Mainline piping, Control wires & Valves, running parallel to the Main Drive Routes, Precisely 5ft from road curb.

B. Never lay PVC pipe when there is water in the trench. Never lay PVC pipe when the temperature is 32 degrees Fahrenheit or below.

C. Install the mainline at a bury depth of 18 inches below finished grade and the lateral lines at a bury depth of 12 inches below finished grade. Maintain a six (6) inch clearance between pipes that cross at an intersection and a four (4) inch clearance between pipes that are buried in the same trench or in compliance with local utility code, whichever is greater.

D. Remove all foreign matter or dirt from the inside of the pipe before joining. Cap or plug all lines after installation and prior to testing to minimize entry of foreign material, dirt, animals, etc.

E. Piping shall not exceed bending allowances as specified by the manufacturer. Additional fittings may be required, at no added cost to the Owner, to prevent exceeding the allowable angle of deflection.

3.5 PIPE AND FITTING CONNECTIONS:

A. When connecting Ring-type PVC Piping and fittings, the Contractor shall make certain the each rubber ring gasket is properly fitted into place, free from all foreign objects and properly seated.

B. When connecting solvent weld joints, use only the solvents supplied and/or recommended by the manufacturer of the pipe. Thoroughly clean pipe and fittings of dirt, dust and moisture before applying solvent.

C. Meet ASTM D2855 Standard Practice for making solvent-cemented joints with PVC pipe and fittings. Use only the solvent approved and/or recommended by the pipe manufacturer to make solvent welded joints. Thoroughly clean pipe and fittings of dirt, dust and moisture before applying solvent.

D. Allow all solvent-cemented joints to set a minimum of 24 hours prior to pressurization of system.

3.6 THRUST BLOCKING

A. All changes in pipe direction at gasket bell joints including elbows, tees, reducers, valves and fittings must be suitably thrust blocked with concrete to prevent any movement of the joint. The Contractor shall strictly follow the pipe manufacturer's recommendations in regards to thrust block positioning and sizing according to pipe size and soil types encountered.

B. Concrete thrust blocks shall have minimum compression strength of 2,000 pounds per square inch. The mixture is one part cement, two parts washed sand and five parts gravel. Thrust blocks must be constructed so the bearing surface is in direct line with the major force created by the pipe or fitting. The earth bearing surface should be undisturbed (virgin wall).

C. Use Mechanical Joint Restraints, if suitable Thrust Blocking cannot be constructed due to soil or site conditions.

3.7 WIRE INSTALLATION:

A. Verify that the work of this section is installed in strict accordance with the latest edition of the National Electric Code and local electrical codes.

B. Install neutral and control wires, 12 inches below finish grade, in the same trenches as the main and lateral lines. The wires shall be installed in a neat and orderly fashion and bundled together and taped every 10 feet. Snake wires in trench to allow for expansion and contraction and provide slack loops at every splice, change of direction, at the valves, where the wire enters the conduit for the automatic controller and at least every 100 feet in runs more than 100 feet in length. The slack loops shall be created by wrapping 3 feet of wire around a 1/2 inch diameter pipe to form a coil.

C. Solder or join all wire connections by positive mechanical connectors. Splices must be properly insulated and waterproofed. Control wire splices will be allowed only in runs more than 500 feet and only in valve boxes.

3.8 CONTROLS AND SENSOR INSTALLATION:

A. Coordinate with the Owner or Owner's Representative the exact location of the **existing** Central Irrigation Control System in Visitors Center Office. Coordinate exact locations of Satellite Controllers on-site based on results of Site Survey of radio transmitted signals. Connect all wiring in accordance with manufacturer's instructions. Provide separate, secured to the wall, conduits for both power supply and control wiring. Provide electrical grounding and surge protection for the controls in accordance with the manufacturer's instructions.

B. Contractor is responsible for programming the control system or securing the services of a qualified representative who is familiar with the specified control system. Program System using the guidelines outlined in section 2.4 of these specifications.

C. Contractor shall provide a 120vac; 1phase power supply in a j-box at the satellite locations and conduits for control wiring and Grounding.

D. Inspect condition and operation of existing rain and freeze sensors.

3.9 VALVE INSTALLATION:

A. The remote control valves shall be installed in accordance with manufacturer's instructions. Valves shall be installed in Rainbird valve boxes or approved equal. Boxes shall be installed to a height that will not cause them to interfere with maintenance machinery and which is sufficient to prevent soil or mulch from washing into the box. Provide a 6 inch layer of washed gravel in the bottom of the valve box.

B. The quick coupling valves shall be installed on PVC threaded swing joints on the irrigation mainline. Space quick coupling valves as shown on the plans. Provide a 1"x1"x3' piece of angle iron next to the quick coupling valve and anchor with two (2) stainless steel hose clamps.

C. The automatic drain valves shall be installed in the low points of the lateral lines. Dig a minimum two (2) cubic foot hole where the drain valve is to be located. Install the drain valve in a PVC tee pointing downward at a 45 degree angle. Surround the drain valve with a minimum one (1) cubic foot of gravel. Place an 18"x18" piece of weed cloth or burlap on top of the gravel. Finish to grade with top soil.

D. Install in the low points of the mainline, manual gate valves as needed for draining. Install 24" off of the mainline in 10" valve boxes.

3.10 FLUSHING AND PRESSURE TESTING:

A. Prior to backfilling and installation of sprinkler heads, exercise extraordinary caution in flushing and pressuring the irrigation mainlines. Under NO circumstances shall portions of the piping system be flushed through the sprinkler heads. Should it be concluded that the mainlines where in fact flushed through sprinkler heads, then the Contractor shall be fully accountable for all equipment and labor cost throughout the warranty period for equipment replacement or repair as determined by the Owner.

B. With zone valves closed, pressure test mainlines by supplying and maintaining full static pressure continuously for one full hour. Observe for evidence of leakage by monitoring pump station flow and by visual inspection of the exposed lines. Repair all leaks and retest until no water flow is observed.

3.11 SPRINKLER HEAD INSTALLATION:

A. After landscape finish grading is accomplished, install heads to finished grade in lawn and shrub areas and backfill with clean topsoil so head is stabilized and no lateral motion is exhibited during operation. Heads in the turf areas shall be set flush with the finished grade and not a hazard to pedestrians and/or maintenance machinery. Set sprinkler heads to plumb within 1/16" and a minimum of 4 inches and a maximum of 6 inches from walls, walks and curbs.

B. Sprinkler heads to be spaced so as not to throw water on the buildings, walks or driveways. Heads shall be adjusted as required so that foliage of plants will not obstruct the spray and that the system has 100% coverage.

C. Provide connection to the PVC lateral lines, for spray heads and small rotors, with barbed fittings and swing pipe. Do not use more than 18 inches of swing pipe for each sprinkler head.

D. Provide connection to the PVC lateral lines, for large rotors, with PVC Swing Joints.

3.12 OPERATION, TESTING AND BALANCING:

A. Testing: Upon completion of the irrigation system, and after pressure testing and head installation, the entire system shall be tested for proper operation. All air shall be flushed from the system and all components checked for proper operation. The system shall be tested in strict accordance with all applicable codes, ordinances and regulations.

B. Any portions requiring repair shall be replaced or repaired and test repeated. No testing shall be done until the last solvent welded joint has had 12 hours to set and cure.

C. Balancing and Adjustment: The Contractor shall balance and adjust the various components of the system so that the overall operation is most efficient. This work shall include adjustment to all sprinkler heads and individual station adjustments on the controller. Observe that all zones function properly and in the correct sequence.

3.13 INSPECTION AND ACCEPTANCE:

A. The Owner or Owner's Representative shall inspect the total work for acceptance upon written request from the Contractor. The request shall be received at least seven (7) days before the anticipated date of inspection. During the inspection, a list of items which need completion or correction will be compiled by the Owner's Representative. The Contractor shall have two (2) weeks to complete and/or correct all items listed. Under unusual circumstances a longer time period may be granted to the Contractor. If such work is not completed within the specified time the Contractor may be considered to have defaulted on the contract, and the Owner may use the contract retainage and/or pursue other Contractors to finish the work.

B. During Final Inspection, Contractor shall operate entire irrigation system, in the presence of the Owner and Landscape Architect, to demonstrate that newly installed irrigation zones blend seamlessly with existing system.

C. Upon completion and/or correction of all items on the list, the Owner's Representative shall certify in writing to the Owner as to the total acceptance of the work.

3.14 RECORD DRAWINGS AND OWNER ORIENTATION

A. As Built plans and updated AutoCad drawing files, reflecting all information shown on the record drawings shall be completed prior to final acceptance of the irrigation system.

B. Upon acceptance of the system, prepare two copies of as-built drawings, product manuals, specifications, operating, maintenance and winterization instructions which fully and accurately describe the irrigation system and its components. Bind all information in a hard-cover, labeled binder and furnish to the Owner and User.

C. Upon acceptance of the system, the Contractor shall orient the Owner to the operation and adjustments of the controller according to local seasonal requirements. The Contractor shall also familiarize the Owner with sprinkler and valve adjustments. The Owner is, in general, to be totally familiarized with the overall operation, adjustment, maintenance and intent of the irrigation system, including the measures that should be taken to provide winterization for the system. Such instructions should be in written form and presented to the party responsible for the care and maintenance of the irrigation system and its components.

D. Upon acceptance of the system, the Contractor shall furnish a certificate of warranty registration and a written guarantee of work and materials, excluding vandalism, occupancy of the project, owner neglect and acts of God, for a one-year period from the date of final acceptance of the project by the Owner.

END OF SECTION

SECTION 329200

TURF AND GRASSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Seeding.
2. Sodding.

1.2 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

I. Surface Soil: Whatever soil is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Certification of grass seed.

1. Certification of each seed mixture for turfgrass sod and native grass, forb and wildflower seeded areas.

B. Product certificates.

1.5 QUALITY ASSURANCE

A. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

1. Pesticide Applicator: State licensed, commercial.

B. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory.

1. The soil-testing laboratory shall oversee soil sampling.
2. Report suitability of tested soil for turf growth.

a. State recommendations for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
b. Report presence of problem salts, minerals, or heavy metals; if present, provide additional recommendations for corrective action.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.

1.7 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is

planted and continue until acceptable turf is established but for not less than the following periods:

1. Seeded Turf: 30 days from date of Substantial Completion.

    a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

2. Sodded Turf: 60 days from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SEED

A. Native Seed Mix: Proprietary seed mix as indicated in construction drawings:

1. Products: Available from but not limited to the following:

    a. Native American Seed: 800-728-4043

    b. Wildseed Farms: 800-848-0078

    c. Ernst Conservation Seeds: 800.873.3321

2.2 TURFGRASS SOD

A. Turfgrass Sod: Certified complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.

B. Turfgrass Species: Sod of grass species as follows:

1. Full Sun: Tifway ‘419’ Bermuda Grass

2. Full – Partial Sun: Zoysia ‘Meyer’

2.3 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: T, with a minimum of 99 percent passing through No. 8 (2.36-mm) sieve and a minimum of 75 percent passing through No. 60 (0.25-mm) sieve.
2. Class: O, with a minimum of 95 percent passing through No. 8 (2.36-mm) sieve and a minimum of 55 percent passing through No. 60 (0.25-mm) sieve.

B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6 (3.35-mm) sieve and a maximum of 10 percent passing through No. 40 (0.425-mm) sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Aluminum Sulfate: Commercial grade, unadulterated.

E. Perlite: Horticultural perlite, soil amendment grade.

F. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 (0.30-mm) sieve.

G. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

H. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.4 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch (25-mm)]sieve; soluble salt content of 7 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings. Available from American Composting Inc. (501) 945-8888

B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture, with a pH range of 3.4 to 4.8.

C. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.

D. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

E. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.5 FERTILIZERS

A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 1 percent nitrogen and 10 percent phosphoric acid.

B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.

D. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

2.6 PLANTING SOILS

A. Planting Soil: Existing, in-place or excavated surface soil up to 4" depth after vegetative layer is scraped off and discarded. Verify suitability of soil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix soil with the following soil amendments in the following quantities to produce planting soil: Submit soil testing for each planting area type (Bermuda grass and native grasses, wildflowers, forbs and amend soil and directed) Soil to be submitted to: Pulaski County Extension Office

1. Ratio of Loose Compost to Topsoil by Volume: 1:3.
2. Weight of Lime per 1000 Sq. Ft. (92.9 Sq. m): Per soil test results for bermuda grass areas only.
3. Weight of Superphosphate per 1000 Sq. Ft. (92.9 Sq. m): Per soil test results verify with landscape architect
4. Weight of Commercial Fertilizer per 1000 Sq. Ft. (92.9 Sq. m): Per soil test results Bermuda grass areas only – Verify with landscape architect
5. Weight of Slow-Release Fertilizer per 1000 Sq. Ft. (92.9 Sq. m): Verify with landscape architect.

2.7 MULCHES

A. Erosion Control Blankets - Biodegradable

B. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch (25-mm) sieve; soluble salt content of 2 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings.

2.8 PESTICIDES

A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

PART 3 - EXECUTION

3.1 TURF AREA PREPARATION

A. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches (150 mm) Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply superphosphate fertilizer directly to subgrade before loosening (Bermuda grass seeded areas only).
2. Thoroughly blend planting soil off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
3. Spread planting soil to a depth of 3 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

    a. Reduce elevation of planting soil to allow for soil thickness of sod.

B. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:

1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
2. Loosen surface soil to a depth of at least 6 inches (150 mm) Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 6 inches (150 mm)] of soil. Till soil to a homogeneous mixture of fine texture.

    a. Apply superphosphate fertilizer directly to surface soil before loosening in Bermuda grass areas only.

3. Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, trash, and other extraneous matter.
4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

D. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

E. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.2 NATIVE GRASS, FORBS AND WILDFLOWER SEEDING

A. Apply ½" Organic Compost all native seeded areas.

B. Sow seed at rate indicated in section 2.1

C. Seed shall be pressed firmly in the top 1/16" of the finished surface soil. Seed shall be visible and not covered by soil.

D. Protect seeded areas with biodegradable erosion control blankets, secure with bio-degradable anchors.

3.3 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. Lay sod across angle of slopes exceeding 1:3.
2. Anchor sod on slopes exceeding 1:6 with wood pegs or steel staples spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.

C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below sod.

3.4 TURF MAINTENANCE

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf for a period of 60 days after substantial completion. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

B. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain height appropriate for species without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings.

C. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

3.5 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Landscape Architect:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding [90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm)
2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

END OF SECTION 329200

SECTION 32 93 00

EXTERIOR PLANTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Landscape and Plantings as indicated on the drawings.

1.2 DESCRIPTION

A. Provide trees, shrubs, and ground covers as shown and specified. The work includes:

1. Soil preparation.
2. Trees, shrubs, and ground covers.
3. Planting mixes.
4. Mulch and planting accessories.
5. Maintenance.

B. Related work:

1. Section 328400: Irrigation System

1.2 QUALITY ASSURANCE

A. Plant names indicated, comply with "Standardized Plant Names" as adopted by the latest edition of the American Joint Committee of Horticultural Nomenclature. Names of varieties not listed conform generally with names accepted by the nursery trade. Provide stock true to botanical name and legibly tagged.

B. Comply with sizing and grading standards of the latest edition of "American Standard for Nursery Stock" by the American Association of Nurserymen and, "Grades and Standards" by the Arkansas Association of Nurserymen. A plant shall be dimensioned as it stands in its natural position.

C. All plants shall be nursery grown under climatic conditions and soil conditions similar to those in the locality of the project for a minimum of 2 years.

D. Stock furnished shall be at least the minimum size indicated. Larger stock is acceptable, at no additional cost, and providing that the larger plants will not be cut back to size indicated. Provide plants indicated by two measurements so that only a maximum of 25% are of the minimum size indicated and 75% are of the maximum size indicated.

E. All trees shall be cured for a period of at least six weeks. Landscape Contractor shall submit a written statement that the specified trees have been properly cured for at least six weeks. The statement will be submitted to the Landscape Architect before shipment of the trees to the site

F. Provide "specimen" plants with a special height, shape, or character of growth. Tag specimen trees or shrubs at the source of supply. Specimen plants may be inspected by the Landscape Architect and reviewed at the place of growth, for compliance with specification requirements for quality, size, and variety. Such approval shall not impair the right of inspection and rejection upon delivery at the site or during the progress of the work.

G. Trees not considered "specimen" shall be reviewed by the Landscape Architect through photographs from the place of growth for compliance with specification requirements for quality, size, and variety. Such approval shall not impair the right of inspection and rejection upon delivery at the site or during the progress of the work.

H. The Landscape Architect will inspect a representative sample of container plants at the Landscape Contractor's holding yard for suitability and adaptability to selected location, prior to site delivery.

I. Provide and pay for material testing. Testing agency shall be acceptable to the Landscape Architect. Provide the following data:

1. Test representative material samples proposed for use.
2. Topsoil:
   a. pH factor.
   b. Mechanical analysis.
   c. Percentage of organic content.
   d. Recommendations on type and quantity of additives required to establish satisfactory pH factor and supply of nutrients to bring nutrients to satisfactory level for planting.
3. Peat Moss:
   a. Loss of weight by ignition.
   b. Moisture absorption capacity.

J. All work shall be performed by a licensed and bonded Landscape Contractor.

1.3 SUBMITTALS

A. Submit the following material samples in 6 ounce glass containers to the Landscape Architect for approval prior to construction.

1. Sandy Loam
2. Peat Moss
3. Sand
4. Fertilizer
5. Manure
6. Hardwood mulch

B. Submit the following materials certification:

1. Topsoil source and pH value.
2. Planting Mix.
3. Plant fertilizer.

C. Submit material test reports.

D. Submit written verification of required curing period.

E. Upon plant Substantial Completion, submit written maintenance instructions recommending procedures for maintenance of plant materials.

F. Provide plant material record drawings:

1. Legibly mark drawings to record actual construction.
2. Indicate horizontal and vertical locations, referenced to permanent surface improvements.
3. Identify field changes of dimension and detail and changes by Change Order.

G. Submit for the Landscape Architect's approval five samples of each container grown plant under the number 15 container size. The five approved samples shall be retained in a protected location on the project site at a location approved by the General Contractor. The Landscape Contractor shall maintain the sample plants until completion of the site planting. The sample plants may then be used in the site planting.

1.4 DELIVERY, STORAGE, AND HANDLING.

A. Deliver fertilizer materials in original, unopened, and undamaged containers showing weight, analysis, and name of manufacturer. Store in manner to prevent wetting and deterioration.

B. Take all precautions customary in good trade practice in preparing plants for moving. Workmanship that fails to meet the highest standards will be rejected. Spray "Anti-Desiccant" immediately after digging to prevent dehydration. Dig, pack, transport, and handle plants with care to ensure protection against injury. Inspection certificates required by law shall accompany each shipment invoice or order to stock and on arrival, the certificate shall be filed with the Landscape Architect. Protect all plants from drying out. If plants cannot be planted immediately upon delivery, properly protect them with soil, wet peat moss, or in a manner acceptable to the Landscape Architect. Water heeled-in plantings daily. No plant shall be bound with rope or wire in a manner that could damage the branches.

C. Cover plants transported on open vehicles with a protective covering to prevent wind burn.

D. Provide dry, loose topsoil for planting bed mixes. Frozen or muddy topsoil is not acceptable.

E. Pruning is acceptable providing the Landscape Contractor has consulted with the Landscape Architect.

F. Notify Landscape Architect 48 hours prior to shipment of plant materials.

1.5 PROJECT CONDITIONS

A. Work notification: Notify Landscape Architect at least 7 working days prior to installation of plant material.

B. Protect existing utilities, paving, and other facilities from damage caused by landscaping operations.

C. A complete list of plants, including a schedule of sizes, quantities, and other requirements is shown on the drawings. In the event that quantity discrepancies or material omissions occur in the plant materials list, the planting plans shall govern.

1.6 WARRANTY

A. Warrant plant material to remain alive and be in healthy, vigorous condition for a period of 1 year after completion and acceptance of entire project.

1. A review of plants will be made by the Landscape Architect at Substantial Completion and Final Completion.

B. Replace, in accordance with the drawings and specifications, all plants that are dead or, as determined by the Landscape Architect, are in an unhealthy or unsightly condition, and have lost their natural shape due to dead branches, or other causes such as bark abrasions and misuse of chemicals, due to the Landscape Contractor's negligence. The cost of such replacement(s) is at Landscape Contractor's expense. Warrant all replacement plants for 1 year after installation.

C. Warranty shall not include damage or loss of trees, plants, or ground covers caused by fires, floods, freezing rains, lightning storms, or winds over 75 miles per hour, winter kill caused by extreme cold and severe winter conditions not typical of planting area, acts of vandalism or negligence on the part of the owner.

D. Remove and immediately replace all plants, as determined by the Landscape Architect, to be unsatisfactory during the initial planting installation.

PART 2 PRODUCTS

2.1 MATERIALS

A. Plant Material: Provide plants typical of their species or variety; with normal, densely-developed branches and vigorous, fibrous root systems. Provide only sound, healthy, vigorous plants free from defects, disfiguring knots, sunscald injuries, frost cracks, abrasions of the bark, plant diseases, insect eggs, borers, and all forms of infestation. All plants shall have a fully developed form without voids and open spaces. Plants held in storage will be rejected if they show signs of growth during storage.

1. Dig balled and burlapped plants with firm, natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant. Provide ball sizes complying with the latest edition of the "American Standard for Nursery Stock" for material grown outside of Arkansas. Comply with the latest edition of the "Arkansas Association of Nurserymen Grades and Standards" for materials grown within Arkansas. Cracked or mushroomed balls are not acceptable. Minimum acceptable ratio of caliper inch to root ball size shall be 1/9".
2. Container-grown stock: Grown in a container for sufficient length of time for the root system to have developed to hold its soil together, firm and whole.
    a. No plants shall be loose in the container.
    b. Container stock shall not be pot bound.
3. Provide tree species that mature at heights over 20'-0" with a single main trunks with an unbroken leader. Trees that have the main trunk forming a "Y" shape or a broken leader are not acceptable.
4. Plants planted in rows shall be matched in form, height and overall character.
5. Plants larger than those specified in the plant list may be used when acceptable to the Landscape Architect.

a. If the use of larger plants is acceptable, increase the spread of roots or root ball in proportion to the size of the plant.

6. The height of the trees, measured from the crown of the roots to the top of the top branch, shall not be less than the minimum size designated in the plant list.
7. Pruning wounds with a diameter of 3/4" or less must show vigorous bark on all edges. Pruning wounds over 3/4" diameter are unacceptable
8. Shrubs and small plants shall meet the requirements for spread and height indicated in the plant list.

    a. The measurements for height shall be taken from the ground level to the average height of the top of the plant and not the longest branch.
    b. Single stemmed or thin plants will not be accepted.

    c. Side branches shall be generous, well-twigged, and the plant as a whole well-bushed to the ground.

    d. Plants shall be in a moist, vigorous condition, free from dead wood, bruises, or other root or branch injuries.

B. Bed Preparation Materials:

1. Loam Topsoil: Fertile, friable, natural topsoil of loamy character, without admixture of subsoil material, obtained from a well-drained arable site, reasonably free from clay, lumps, coarse sands, stones, plants, roots, sticks, and other foreign materials, with acidity range to match existing soil conditions.

    a. Identify source location of topsoil proposed for use on the project.
    b. Provide topsoil free of substances harmful to the plants which will be grown in the soil.
2. Planting Mix: (All trees, shrub and groundcover planting areas)Commercial grade premixed planting mix (Submit supplier). Ingredients 70% Sandy Loam Topsoil and 30% Compost.
   pH 6.0

3. Fertilizer:

    a. Plant Fertilizer Type "A": Commercial type approved by the Landscape Architect, containing 15% nitrogen, 5% phosphoric acid, and 10% potash by weight. 1/4 of nitrogen in the form of nitrates, 1/4 in form of ammonia salt, and 1/2 in form of organic nitrogen.
4. Anti-Desiccant: Protective film emulsion providing a protective film over plant surfaces; permeable to permit transpiration. Mixed and applied in accordance with manufacturer's instructions.
5. Water: Free of substances harmful to plant growth. Hoses or other methods of transportation furnished by Landscape Contractor.
6. Water: Water will be available on site at no cost to the Landscape Contractor. Contractor will provide necessary hoses and other watering equipment required to maintain and complete work.

2.2 ACCESSORIES

1. Mulch: Premium grade Hardwood mulch. Furnish in 2 cu. ft. bags or bulk.
2. Aluminum Edging: Permaloc – Clean line 3/16”x4” – 1-800-356-9660 or equal.

2.3 PLANT LIST

The plant list including quantities is located on the plans. It is the responsibility of the contractor to determine total quantities in conformance with the plans. Height of plants specified and height of lowest branches of trees is above soil line.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine proposed planting areas and conditions of installation. Do not start planting work until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Time of planting:

1. Evergreen material: Plant evergreen materials between September 1 and November 1 or in spring before new growth begins. If project requirements require planting at times, other than winter months, plants shall be sprayed with anti-desiccant prior to planting operations.
2. Deciduous material: Plant deciduous materials in a dormant condition. If deciduous trees are planted in-leaf, they shall be sprayed with an anti-desiccant prior to planting operation.

B. Planting shall be performed only by experienced workmen familiar with planting procedures under the supervision of a qualified supervisor.

C. Locate plants as indicated on the plans, or as approved by the Landscape Architect in the field after staking by the Landscape Contractor. If obstructions are encountered that are not shown on the drawings, do not proceed with planting operations until alternate plant locations have been selected by the Landscape Architect.

D. Excavate circular plant pits with vertical sides, except for plants specifically indicated to be planted in beds. Provide shrub pits at least 12" greater than the diameter of the root system and 24" greater for trees. Depth of it shall accommodate the root system. Scarify the bottom of the pit to a depth of 4". Remove excavated materials from the site.

E. For plant pits excavated in rock, test the percolation rate by filling the pit to the rim with water. If water remains in the pit for a period of more than 12 hours, fracture the bottom of the pit. Repeat the percolation test and fracture as required to provide adequate drainage.

F. Provide pre-mixed planting mixture for use around the balls and roots of the trees and shrubs consisting of 70% Sandy Loam Topsoil and 30% Compost and 1/2 lb. plant fertilizer Type "A" for each cu. yd. of the mixture.

G. Provide pre-mixed ground cover bed planting mixture consisting of 70% Sandy Loam Topsoil and 30% Compost and 1/2 lb. plant fertilizer Type "A" per cu. yd. Provide beds a minimum of 8" deep. If slopes are greater than 4:1 increase depth to 12".

3.3 INSTALLATION

A. Set plant material in the planting pit to proper grade and alignment. Set plants upright, plumb, and faced to give the best appearance or relationship to each other or adjacent structure. Set plant material 2"-3" above the finish grade. No filling will be permitted around trunks or stems. Backfill the pit with planting mixture. Do not use frozen or muddy mixtures for backfilling. Form a ring of soil around the edge of each planting pit to retain water.

B. After balled and burlapped plants are set, muddle planting soil mixture around bases of balls and fill all voids. Remove wire from the top one-third of all tree balls.

C. Space ground cover plants in accordance with indicated dimensions. Adjust spacing as necessary to evenly fill planting bed with indicated quantity of plants. Plant to within 18" of the trunks of trees and shrubs within planting bed and to within 6" of edge of bed.

D. Mulching:

1. Mulch tree and shrub planting pits and shrub beds with required mulching material 3" deep immediately after planting. Thoroughly water mulched areas. After watering, rake mulch to provide a uniform finished surface.
2. Mulch ground cover beds with mulch 3" deep immediately after planting.

G. Pruning/Thinning of Tree Canopy

Submit to the Landscape Architect photographs of the pruned trees prior to shipment to the holding yard of the Landscape Contractor. Trees will be accepted by the Landscape Architect providing photographs of each tree are approved for use on the project, and that:

1. Leaves of deciduous stock are removed by hand immediately after planting to balance the loss of roots while preserving the natural character appropriate to the particular plant requirements. In general, remove 1/4 of the interior leaves, proportion shall in all cases be acceptable to the Landscape Architect. Remove or cut back broken, damaged, and unsymmetrical growth of new wood.

2. Multiple leader plants: Preserve the leader which will best promote the symmetry of the plant. Cut branches flush with the trunk or main branch, at a point beyond a lateral shoot or bud a distance of not less than 1/2 the diameter of the supporting branch. Make cut on an angle.

3.4 MAINTENANCE

A. Maintain the trees, shrubs and ground covers until Substantial Completion of the entire project. Upon Substantial Completion, the Owner will assume maintenance as recommended by the written maintenance instructions submitted by the Landscape Contractor.

B. Maintenance shall include pruning, cultivating, weeding, watering, and application of appropriate insecticides and fungicides necessary to maintain plants free of insects and disease.

1. Re-set settled plants to proper grade and position. Restore planting saucer and adjacent material and remove dead material.
2. Tighten and repair guy wires and stakes as required.

3. Correct defective work as soon as possible after deficiencies become apparent and weather and season permit.
4. Deep-water trees, plants, and ground cover beds within the first 24 hours of initial planting, and thereafter as required for healthy growth until final acceptance.

3.5 SUBSTANTIAL COMPLETION

A. An inspection of the trees, shrubs and ground covers will be made by the Landscape Architect upon request for Application of Substantial Completion by the Landscape Contractor. Provide notification of at least five (5) working days before requested inspection date.

3.6 FINAL COMPLETION

A. An inspection of the trees, shrubs and ground covers will be made by the Landscape Architect upon request for Final Completion by the Landscape Contractor.

END OF SECTION

SECTION 33 05 13

MANHOLES AND STRUCTURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Modular precast concrete manhole and structures with tongue-and-groove joints with masonry transition to cover frame, covers, anchorage, and accessories for junction box structures and irrigation wetwell.
   2. Bedding and cover materials.

B. Related Sections:
   1. Section 312000 - Earthwork
   2. Section 031000 - Concrete Forms and Accessories.
   3. Section 032000- Concrete Reinforcement.
   4. Section 033000 - Cast-in-Place Concrete:

1.2 REFERENCES

A. American Concrete Institute:
   1. ACI 318 - Building Code Requirements for Structural Concrete.
   2. ACI 530/530.1 - Building Code Requirements for Masonry Structures and Specifications for Masonry Structures.

B. ASTM International:
   1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
   2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
   3. ASTM A536 - Standard Specification for Ductile Iron Castings.
   4. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
   5. ASTM C55 - Standard Specification for Concrete Brick.
   6. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale).
   7. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
   8. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
   9. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
   10. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.
   11. ASTM D3753 - Standard Specification for Glass-Fiber-Reinforced Polyester Manholes.

1.3 DESIGN REQUIREMENTS

A. Equivalent strength: Based on structural design of reinforced concrete as outlined in ACI 318.

B. Design of Lifting Devices for Precast Components: In accordance with ASTM C913.

C. Design of Joints for Precast Components: In accordance with ASTM C913; maximum leakage of 0.025 gallons per hour per foot of joint at 3 feet of head.

1.4 SUBMITTALS

A. Section 013300 – Submittal procedures.

B. Shop Drawings: Indicate manhole and structure locations, elevations, piping, and sizes and elevations of penetrations.

C. Product Data: Submit cover and frame construction, features, configuration, and dimensions.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with the City of Birdeye's applicable standards and requirements.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section.

1.7 DELIVERY, STORAGE AND HANDLING

A. Comply with precast concrete manufacturer's instructions for unloading, storing and moving precast manholes and structures.

B. Store precast concrete manholes and structures to prevent damage to Owner's property or other public or private property. Repair property damaged from materials storage.

C. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers shown on Drawings to indicate its intended use.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Requirements: ACI 530.

PART 2 PRODUCTS

2.1 MANHOLES AND STRUCTURES

A. Manhole and Structure Sections: Reinforced precast concrete in accordance with ASTM C478 with gaskets in accordance with ASTM C923.

B. Mortar and Grout: Masonry Mortar and Grout. Type S.

C. Reinforcement: As specified in Section 032000, Concrete Reinforcement.

2.2 FRAMES AND COVERS

A. Manufacturers:
   1. Refer to Drawings for frame, grates, and covers required for each manhole and structure.

B. Product Description: Cast iron construction, machined flat bearing surface and as shown on the Drawings.

2.3 COMPONENTS

A. Manhole Steps: corrosion resistant, coated, and reinforced with steel per ASTM C-478. Steel reinforcing minimum 1/2" diameter. Formed integral with manhole and structure sections.

2.4 CONFIGURATION

A. Shaft Construction: As indicated on the Drawings, lipped male/female joints; sleeved to receive pipe sections.

B. Shape: As indicated on the Drawings

C. Clear Inside Dimensions: As indicated on the Drawings.

D. Design Depth: As indicated on Drawings.

E. Clear Cover Opening: As indicated on Drawings.

F. Pipe Entry: Furnish openings as indicated on Drawings.

G. Steps: As required by code.

2.5 BEDDING AND COVER MATERIALS

A. Refer to Section 312116, Trenching.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify items provided by other sections of Work are properly sized and located.

B. Verify built-in items are in proper location, and ready for roughing into Work.

C. Verify correct size of manhole and structure excavation.

3.2 PREPARATION

A. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.

B. Do not install structures where site conditions induce loads exceeding structural capacity of structures.

C. Inspect precast concrete structures immediately prior to placement in excavation to verify structures are internally clean and free from damage. Remove and replace damaged units.

3.3 INSTALLATION

A. Excavation and Backfill:
   1. Excavate for manholes and structures in accordance with Section 312000 in location and to depth shown. Provide clearance around sidewalls of structure for construction operations.
   2. When groundwater is encountered, prevent accumulation of water in excavations. Place manholes and structures in dry trench.
   3. Where possibility exists of watertight structure becoming buoyant in flooded excavation, anchor structure to avoid flotation.

B. Place base pad, trowel top surface level.

C. Place manhole [and structure] sections plumb and level, trim to correct elevations, anchor to base pad.

D. Backfill excavations for manholes and structures in accordance with Section 312000.

E. Form and place manhole and structures cylinder plumb and level, to correct dimensions and elevations.

F. Cut and fit for pipe sections.

G. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour to form continuous drainage channel as indicated on Drawings.

H. Set cover frames and covers level without tipping, to correct elevations.

I. Coordinate with other sections of Work to provide correct size, shape, and location.

3.4 PRECAST CONCRETE MANHOLE AND STRUCTURE INSTALLATION

A. Lift precast components at lifting points designated by manufacturer.

B. When lowering manholes and structures into excavations and joining pipe to units, take precautions to ensure interior of pipeline and structure remains clean.

C. Set precast structures bearing firmly and fully on crushed stone bedding, compacted in accordance with provisions of Section 312000 and 312116 or on other support system shown on Drawings.

D. Assemble multi-section structures by lowering each section into excavation. Lower, set level, and firmly position base section before placing additional sections.

E. Remove foreign materials from joint surfaces and verify sealing materials are placed properly. Maintain alignment between sections by using guide devices affixed to lower section.

F. Joint sealing materials may be installed on site or at manufacturer’s plant.

G. Verify manholes and structures installed satisfy required alignment and grade.

H. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe. Fill annular space with mortar.

I. Cut pipe to finish flush with interior of structure.

J. Shape inverts through manhole and structures as shown on Drawings.

3.5 FRAME AND COVER INSTALLATION

A. Set frames using mortar and pre-cast concrete rings. Install precast reinforced concrete rings. Lay precast concrete rings in full bed of mortar and completely fill joints.

3.6 FIELD QUALITY CONTROL

A. Test cast-in-place concrete in accordance with Section 033000.

B. Vertical Adjustment of Existing Manholes and Structures:
   1. Where required, adjust top elevation of existing manholes and structures to finished grades shown on Drawings.
   2. Reset existing frames, grates and covers, carefully removed, cleaned of mortar fragments, to required elevation in accordance with requirements specified for installation of castings.
   3. Remove concrete without damaging existing vertical reinforcing bars when removal of existing concrete wall is required. Clean vertical bars of concrete and bend into new concrete top slab or splice to required vertical reinforcement, as indicated Drawings.
   4. Clean and apply sand-cement bonding compound on existing concrete surfaces to receive cast-in-place concrete in accordance with Section 033000.

END OF SECTION

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SECTION 33 41 11

STORM DRAINAGE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Storm drainage piping.
2. Accessories.
3. Underground pipe markers.
4. Catch basins and plant area drains.

B. Related Sections:
1. Section 312000 – Earthwork: Backfill and compaction for structures and storm piping.
2. Section 312116 - Trenching: Execution requirements for trenching required by this section.
3. Section 330513 - Manholes and Structures.
4. Section 033000 - Cast-in-Place Concrete: Concrete type for catch basin base pad construction.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:
1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:
1. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.
2. ASTM C14 - Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
3. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
4. ASTM C443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
5. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
6. ASTM C924 - Standard Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method.
7. ASTM C969 - Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
8. ASTM C1103 - Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
9. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
10. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft3 (2,700 kN-m/m3)).
11. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
12. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.

13. ASTM D2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
14. ASTM D2729 - Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
15. ASTM D2751 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.
16. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
17. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
18. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
19. ASTM D3034 - Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
20. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.3 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit data indicating pipe, pipe accessories, and appertenances.

C. Manufacturer's Installation Instructions: Submit special procedures required to install Products specified.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents:
1. Accurately record actual locations of pipe runs, connections, catch basins, structures, and invert elevations.
2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.5 COORDINATION

A. Coordinate the Work with termination of storm sewer connection outside building, trenching, and to the connection to municipal storm sewer utility service.

PART 2 PRODUCTS

2.1 STORM DRAINAGE PIPING

A. Polyethylene Pipe:
1. Piping and fittings shall be ADS N-12 ST IB pipe as manufactured by Advanced Drainage Systems (ADS) of Hilliard, OH, or equal.
2. Piping and fittings shall have a smooth interior and annular exterior corrugations.
3. Pipe shall be manufactured in accordance with AASHTO M252, Type S or SP for 4-inch through 10-inch diameter, and AASHTO M294 or ASTM F2306 for 12-inch through 60-inch diameter.

4. Pipe shall be joined using a bell and spigot joint meeting AASHTO M252, AASHTO M294 or ASTM F2306. The joint shall be soil-tight and gaskets shall meet the requirements of ASTM F477.
5. Fittings shall conform to AASHTO M252, AASHTO M294, or ASTM F2306. Bell and spigot connections shall utilize a spun-on or welded bell and valley or saddle gasket meeting the soil-tight joint performance requirements of AASHTO M252, AASHTO M294 or ASTM F2306.
6. Virgin material for pipe and fitting production shall be high density polyethylene conforming with the minimum requirements of cell classification 424420C for 4- through 10-inch diameters, or 435400C for 12- through 60-inch diameters, as defined and described in the latest version of ASTM D3350, except that carbon black content should not exceed 4%. The 12- through 60-inch virgin pipe material shall comply with the notched constant ligament-stress (NCLS) test as specified in Sections 9.5 and 5.1 of AASHTO M294 and ASTM F2306, respectively.

B. Perforated Pipe for Underdrains:
1. Piping and fittings shall be perforated ADS single wall corrugated HDPE pipe as manufactured by Advanced Drainage Systems (ADS) of Hilliard, OH, or equal.
2. Perforations shall be Type B pattern as specified by ADS. Contractor shall obtain approval if perforation pattern other than Type B is to be used.
3. Perforated pipe shall be wrapped in geotextile fabric. Fabric shall be 4-oz non-woven geotextile fabric, Mirafi 140N or equivalent.

C. Reinforced Concrete Pipe:
1. Reinforced concrete pipe and flared-end sections: ASTM C 76, Type III, tongue and groove joints.
2. Joint material: cold-applied preformed plastic gasket type sealant conforming to ASTM C 443.

2.2 ACCESSORIES

A. Filter Fabric: Non-biodegradable, non-woven, 6 oz minimum weight.

B. Grout: Specified in Section 033000.

2.3 UNDERGROUND PIPE MARKERS

A. Trace Wire: Magnetic detectable conductor, brightly colored plastic covering, imprinted with "Storm Sewer Service" in large letters.

2.4 CATCH BASINS

A. Cast-in-place concrete as indicated on the Drawings.

2.5 BEDDING AND COVER MATERIALS

A. Bedding: As indicated on the Drawings.

B. Cover: As indicated on the Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on [layout] drawings.

3.2 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with fine aggregate.

B. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.3 BEDDING

A. Excavate pipe trench in accordance with Section 312116 for work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.

B. Place bedding material at trench bottom, level materials in continuous layer not exceeding 8 inches compacted depth.

C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION - PIPE

A. Install pipe, fittings, and accessories in accordance with [ASTM D2321]. Seal joints watertight.

B. Place pipe on bedding material as indicated on the Drawings.

C. Lay pipe to slope gradients noted on drawings with maximum variation from indicated slope of 1/8 inch in 10 feet.

D. Place bedding backfill around pipe as indicated on the Drawings.

E. Install trace wire continuous over top of pipe buried 12 inches below finish grade, above pipe line.

3.5 INSTALLATION - CATCH BASINS AND STRUCTURES

A. Perform work in accordance with Drawings.

B. Refer to Section 330513 Manholes and Structures.

3.6 FIELD QUALITY CONTROL

A. Request inspection prior to and immediately after placing aggregate cover over pipe.

3.7 PROTECTION OF FINISHED WORK

A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.
   1. Take care not to damage or displace installed pipe and joints during construction of pipe supports, backfilling, testing, and other operations.
   2. Repair or replace pipe that is damaged or displaced from construction operations.

END OF SECTION

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ENGINEERING CONSULTANTS, INC.

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PHONE: 501-376-3752
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April 18, 2022

Martin Smith
Ecological Design Group

RE: Arkansas State Veterans Cemetery
3600 AR-163
Birdeye, AR
Our Project Number 22-251

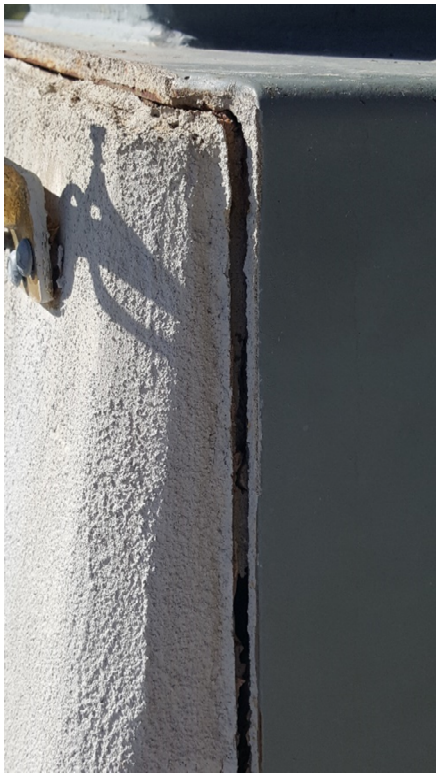
Dear Mr. Smith,

Upon your request, I made a visual observation visit to the above referenced site on April 14, 2022. This report is intended to cover only the integrity of the existing concrete piers due to a crack being found in one of the piers at the Committal Shelter. Architectural, mechanical, and electrical elements were not reviewed and are not addressed in this letter, except as necessary to describe the structural items in question.

The Committal Shelter is an open-air roof structure of laminated wood framing with 3 separate roofs supported on concrete piers. The back of the roof structures bear on a concrete wall, that also provides lateral load resistance.

The east side of the easternmost pier has crack extended all the way thru the top 18 inches or so. The crack is at least 4 inches deep and about ¼ inch wide. I believe the entire face shell of the top 18 inches is loose and need to be removed and replaced. More recommendation will be given later after the following photo descriptions.

The above 3 photos show the south edge of the crack with an ice pick inserted in two locations, and then removed to show the (minimum) depth of the crack (it appears to go all the way thru the face shell).



The above 3 photos show alternate views of the cracked pier.



The above 3 photos show the edges of the various piers. The left and center photos are of the west and center piers. Both have a slight overhang of the steel bracket (horizontal top) base plate over the edge of the concrete piers. The photo on the right is the easternmost pier that is cracked, and it does not have any overhang of the steel base plate. This did not cause the problem, but overhanging steel could have helped protect the cracked concrete from water intrusion and might have help to mitigate this issue if the plate had the overhang. But that is not knowable at this point. However, since we will have a patch joint at this location, it would be a good idea to consider adding a wing onto the side of the base plate (optional).

I recommend that the cracked concrete face shell be removed to expose the steel reinforcement inside. All loose concrete needs to be removed and any visible rebar needs to be scrubbed to remove any loose rust scaling and needs to be exposed on all sides to help the new concrete patch to bond. The new concrete patch needs to be placed using a high-strength bonding agent, such as an epoxy in the concrete mixture. The edges of the patch need to be sealed as tightly as possible, and the entire patch should be coated with a thoro-coat compound that matches the existing applications as closely as possible. It might be necessary to re-coat the entire pier and possibly all 3 piers to get an acceptable match.

I also recommend (optional) adding a strip of steel to the east side of the base plate, to shelter the top edge of the new concrete patch from rain and drip water. This will require a high-quality weld and grinding process to make it look as seamless as possible. I high-quality zinc-rich coating should also be applied to the steel after the welding process is complete. This too will need to match the existing paint/primer colors, or else the entire steel bracket will need to be re-painted.

The concrete piers have an inner core of rebar around a square steel tube column that is embedded in the concrete, so the outer shell of concrete is not carrying load. Therefore, removing the face shell, chipping out the concrete around the outer cage of rebar, and patching the pier will not require shoring of the roof structure.

If upon removal of the face shell and the concrete around the outer rebar cage reveals cracking that penetrates the inner core of the pier, please notify me as soon as possible.

I visually inspected the piers and walls on the Committal Shelter and the Administration Building and did not see any other cracks that needed attention. Photos below.

In conclusion, the only issue I observed was the one cracked pier at the Committal Shelter. The crack needs to be repaired to protect the reinforcing steel from corrosion, which will cause the cracking to get worse very quickly if not attended to in a timely manner. Recommendations are stated above. The structural stability of the Committal Shelter is not presently compromised, but if left unrepaired, the rebar inside the pier could corrode and cause further and deeper damage.

Please let me know if you have any questions or need more information.

Sincerely,

S. Grant Jordan, P.E.
Arkansas PE #8953

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Arkansas Professional Engineering Firm
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