Request for Proposal, 16MCO509 Dirt for Midland County Horseshoe Amphitheater
Date Required: Tuesday January 5, 2016
Time Required: 2:00pm Local Time

INTRODUCTION:
Midland County, hereafter called County, invites sealed proposals from interested qualified Vendors, hereinafter called Vendors, to provide dirt for the Amphitheater. The following pages provide general information about the requirements and specifications for the package.

This request for proposal ("RFP") is part of a competitive procurement process which provides qualified vendors with a fair opportunity for their commodities and services to be considered, and to provide information concerning their expertise and experience in providing similar services to other customers. The RFP process provides a competitive negotiation platform, wherein price or cost is not the sole determinative factor. This process, designed to best serve the interests of the County, allows the County the flexibility to negotiate with interested, qualified Vendors (following designation by the Commissioners Court, one at a time) to arrive at a mutually agreeable relationship.

MANDATORY SITE SURVEY:
An Optional Site Survey will be held at the Midland County Horseshoe. We will meet at the Pavilion Flag Poles at 11:00am on Thursday December 17, 2015 and will promptly begin the survey of the site, which is just east of the Pavilion.

Midland County Horseshoe Arena and Pavilion
2514 Arena Trail
Midland, TX 79701

QUESTIONS:
If further information is required, please contact the Midland County Purchasing Department. All requests for information must be submitted in writing. Responses to all questions received will be sent to each Contractor/Vendor known to have copies of the Request for Proposal. Requests for information may be faxed to 432-688-4914 or e-mailed to pur103@co.midland.tx.us. All questions should be submitted on or before 5:00pm on Friday December 18, 2015. Questions received after said date and time will not receive a response. Answers and clarifications which are considered to materially change the solicitation will be issued as written addenda to the original RFP and will be posted to the Midland County website at www.co.midland.tx.us. Solution providers are responsible for ensuring all answers to questions are reviewed prior to bid submittal and that all issued added are properly acknowledged with their submitted proposal response. Midland County will not be responsible for any verbal exchange between the vendor and an employee of Midland County.
COPIES AND RECEIPT:
Please submit one (1) original, three (3) copies, and an electronic copy on USB drive of the proposal. An executed copy of the Proposal Affidavit SIGNED AND NOTARIZED (Page 7) must be included in each submission. Please note that if no Proposal Affidavit is included, the response will be rejected. Midland County is exempt from all state and federal taxes. Tax exempt certificates are available upon request.

All responses should be submitted in a sealed envelope, marked on the outside,

Dirt for Midland County Horseshoe Amphitheater 16MCO509

________________________
Company Name

Responses must be received by 2:00pm Local Time on Tuesday January 5, 2016. Late proposals will be rejected and returned without being opened. The clock in the Purchasing Agent’s office is the official time piece for this submission. If interested, Contractors may use mail or express systems to deliver their proposal to the Purchasing Department; they should insure that they are tendered to the carrier in plenty of time to reach the Purchasing Department by the time and date required. Facsimile transmitted proposals shall not be accepted.

SUBMISSION LOCATION:  All bids which are mailed, shipped, delivered, etc. should be addressed as follows:

Midland County Purchasing Department
Midland County Courthouse
Attention: Kristy Engeldahl, Purchasing Agent
500 N. Loraine Street, Suite 1101
Midland, Texas 79701

DOCUMENTATION SUBMISSION:
The respondent must submit all required documentation. Failure to provide requested information may result in rejection of the proposal.

ALTERATION OF PROPOSAL:
A proposal may be altered, modified or amended by a Vendor at any time, prior to the time and date set forth above as the submission deadline. Alterations, modifications or amendments to a proposal must be made in the offices of the Purchasing Department. Any interlineations, alteration or erasure made on a proposal before the submission deadline must be initialed by the signer of the proposal, guaranteeing authenticity. A proposal may not be altered, modified or amended after the submission deadline.

WITHDRAWAL:
A proposal may not be withdrawn or canceled by the respondent for a period of sixty (60) days following the date designated for the receipt of proposals, and respondent so agrees upon submittal of their proposal.
CONFLICT OF INTEREST:
No public official shall have interest in this contract, in accordance with Vernon's Texas Codes annotated Local Government Code Title 5, Subtitle C, Chapter 171. Vendor is required to sign affidavit form included in Proposal documents.

SILENCE OF SPECIFICATIONS:
The apparent silence of these specifications as to any detail of the apparent omission from it of a detailed description concerning any point, shall be regarded as meaning that only the best commercial practices are to prevail. All interpretations of these specifications shall be made on the basis of this statement.

CONFIDENTIALITY:
Contents of the proposals will remain confidential until the contract is awarded. At that time the contents will be made public under the Texas Public Information Act; except for any portion of a proposal which has been clearly marked as a trade secret or proprietary data (the entire proposal may not be so marked). Proposals will be opened, and the name of the firm submitting the proposal read aloud, acknowledged, at 2:05pm on Tuesday January 5, 2016, in the Purchasing Department Conference Room located in the Midland County Courthouse, Suite 1101. All respondents or other interested parties are invited to attend the opening.

Vendors are hereby notified that the Owner strictly adheres to all statutes, court decisions, and opinions of the Texas Attorney General with respect to disclosure of public information.

ADDITIONAL INFORMATION AND DEMONSTRATION, NEGOTIATIONS:
Prior to award, selected Vendors may be asked to provide further information concerning their proposal, up to and including presentations/demonstrations. The Midland County Commissioners Court reserves the right to reject any and all proposals or waive formalities as deemed in the best interests of Midland County. The County may also enter into discussions and revisions of proposals after submission and before award for the purpose of obtaining the best and final offer, and to accept the proposal deemed most advantageous to Midland County.

This request for proposal (RFP) is part of a competitive procurement process which is designed to best serve the interests of the County in obtaining complicated commodities and/or services. It also provides interested Contractors with a fair opportunity for their goods and services to be considered. The RFP process is designed to be a competitive negotiation platform, where price is not required to be the sole determinative factor. Also, the County has the flexibility to negotiate with interested vendors (one at a time) to arrive at a mutually agreeable relationship. Negotiations will be arranged with vendors in a hierarchal order, starting with the vendor selected as the primary. If a contract cannot be negotiated, negotiations will, formally and in writing, end with that Vendor and proceed to move to the second vendor, and so forth until a contract is negotiated.
RIGHTS OF THE CONTRACTING AUTHORITY:
Midland County reserves the right to withdraw this RFP at any time and for any reason. Midland County also has the right to terminate its selection process at any time and to reject all responses, or all proposals. Receipt of the proposal materials by Midland County or submission of a proposal to Midland County confers no rights upon the vendor nor obligates Midland County in any manner.

Midland County intends to use the AIA Contract as shown in ATTACHMENT A.

All costs associated with the preparation or submittal of proposals shall be borne by the vendor, and no cost shall be sustained by Midland County.

ORAL COMMITMENT:
Vendors should clearly understand that any verbal representations made or assumed to be made during any discussions held between representatives of an vendor and any Midland County personnel or official are not binding on Midland County.

WAIVER OF CLAIMS:
Submission of a proposal indicates Vendor’s acceptance of the evaluation technique and Vendor’s recognition that some subjective judgments must be made by the County during the determination of qualification.

SELECTION CRITERIA:
Price is a primary consideration, however, it is not the only consideration to be used in the selection. The product and/or service to be provided is also of major importance. Midland County will require that the successful vendor provide a representative for all County related business, service, billing, installation, activation and termination of said service. The evaluation criteria and factors are identified on page 10.

ORDINANCES AND PERMITS:
The Contractor/Vendor agrees, during the performance of the work, to comply with all applicable Federal, State, or local code and ordinances.

INVOICES:
Invoices are to be mailed to P.O. Box 421, Midland, Texas 79702 and should cite the applicable Purchase Order Number. Any and all notices or other communications required or permitted by any contract awarded as a result of this RFP shall be served on or given to Midland County, in writing, by personal delivery to the Purchasing Agent of Midland County, Texas, or by deposit with the United States Mail, postage prepaid, registered or certified mail, return receipt requested, addressed to the Midland County Purchasing Agent 500 N. Loraine Suite 1101 Midland, TX 79701, or at such other address as may have been specified by written notice to Vendor.
INSURANCE:
The awarded Vendor will maintain such insurance as will protect the Vendor and the County from claims under the Workers' Compensation Acts, and any amendments thereof, and from any other claims for damages from personal injury, including death, which may arise from operations under this agreement, whether such operations be by themselves or by any sub-Contractor, or anyone directly or indirectly employed by either of them. Current Certificate of such insurance shall be furnished to Midland County and shall show all applicable coverage(s).

Other insurance requirements are:
- General Liability (including completed operations) with a $1,000,000 per occurrence limit and $2,000,000 general aggregate.
- Commercial Automobile Liability with a limit of no less than $1,000,000. The coverage will also extend liability to hired and non-owned autos.
- Workers' Compensation with limit of $1,000,000 for Employers Liability.
- We also require a minimum umbrella (or follow form excess policy covering over general liability, auto liability and workers compensation) of no less than $2,000,000.
- Builders Risk coverage with a full replacement value. The policy will have both the Contractor and Midland County as named insureds. This will include coverage for Contractors and Subcontractors of All Tiers.

Midland County will require the selected Vendor to name Midland County as an additional for both the general liability and auto liability. A waiver of subrogation in favor of the County is required for the workers compensation. If the additional insured status or waiver of subrogation is not blanket, please send a copy of the actual endorsements prior to commencement of any work.

Midland County will require the selected Vendor to name Midland County as an additional insured and provide a waiver of subrogation prior to making a contract.

INDEMNIFICATION:
The Vendor shall defend, indemnify and save whole and harmless the County and all its officers, agents and employees from and against any and all demands, claims, suits, or causes of action of any character, name, kind or description brought for, or on account of, arising out of or in connection with the Vendor’s performance or non-performance of any obligation of Vendor or any negligent act, misconduct or omission of the Vendor in the performance of its contractual obligations. The Vendor shall defend, indemnify, save, and hold harmless the County and its officers, agents, representatives and employees from and against any and all demands, claims, suits, or causes of action of any character, name, kind or description brought for, on account of, arising out of or in connection with Vendor's product or service.

STATUS OF INDEPENDENT CONTRACTOR:
Vendor shall be considered an independent contractor, for all purposes. Vendor will not at any time, directly or indirectly, act as an agent, servant, representative or employee of the County. Vendor will not take any action which is intended to create any commitments, duties, liabilities or obligations on behalf of the County, without prior written consent of the County.
PARTIAL INVALIDITY:
In the event any one or more of the provisions contained in this RFP or any contract resulting therefore, for any reason, be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision of this RFP or any contract resulting therefore and this RFP or the contract resulting therefore shall be construed as if such invalid, illegal or unenforceable provision had never been contained herein.

CONTRACT TERMINATION:
Non-performance of the Vendor/Contractor in terms of specifications or noncompliance with terms of this contract shall be basis for termination of the contract by the County. Termination in whole or in part, by the County may be made at its option and without prejudice to any other remedy to which it may be entitled at law or in equity, or elsewhere under this contract, by giving (60) sixty days written notice to the Contractor/Vendor with the understanding that all work being performed under this contract shall cease upon the date specified in such notice. The County shall not pay for work, equipment, services or supplies which are unsatisfactory. Contractor/Vendor may be given reasonable opportunity prior to termination to correct any deficiency. This, however, shall in no way be construed as negating the basis for termination for non-performance. The right to terminate the notice thereof is controlled by these proposal specifications and is not subject to being altered by contract.

LAW GOVERNING:
The parties under contract shall be subject to all Federal laws and regulations, and all rules and regulations of the State of Texas. The laws of the State of Texas shall govern the interpretation and application of the contract; regardless of where any disagreement over its terms should arise or any case of action arise.

REMEDIES:
The successful vendor and Midland County agree that both parties have all rights, duties, and remedies available as stated in the Uniform Commercial Code.

VENUE:
It is hereby agreed that the contract will be made in Midland, Midland County, Texas, and any dispute arising as a result of it shall be governed by the laws of the State of Texas for the purpose of any lawsuit, and the parties agree that such lawsuit shall be brought in Midland County, Texas.

FUNDING CONTINGENCY:
Any contract awarded pursuant to this RFP shall be contingent on sufficient funding and authority being made available in each fiscal period by the appropriate officials of Midland County. If sufficient funding or authority is not made available, the contract shall become null and void.

ASSIGNMENT:
The Contractor shall not sell, assign transfer or convey this contract in whole or in part, without the prior written consent of the County.
REQUIRED FORM  
COMPANY AFFIDAVIT

The affiant, ___________________________ states with respect to this submission to County:

I (we) hereby certify that if the contract is awarded to our firm that no member or members of the governing body, elected official or officials, employee or employees of said County, or any person representing or purporting to represent the County, or any family member including spouse, parents, or children of said group, has received or has been promised, directly or indirectly, any financial benefit, by way of fee, commission, finder's fee or any other financial benefit on account of the act of awarding and/or executing a contract.

I hereby certify that I have full authority to bind the company and that I have personally reviewed the information contained in the RFP and this submission, and all attachments and appendices, and do hereby attest to the accuracy of all information contained in this submission, including all attachments and exhibits.

I acknowledge that any misrepresentation will result in immediate disqualification from any consideration in the submission process.

I further recognize that County reserves the right to make its award for any reason considered advantageous to the County. The company selected may be without respect to price or other factors.

Signature ___________________________ Date ______________________

Name ___________________________ Phone ______________________

Title

Firm Name ___________________________

Type of business organization (corporation, LLC, partnership, proprietorship)

Address ___________________________

County, State, Zip ___________________
SPECIFICATION

PURPOSE:
Midland County is in need of a company to obtain, haul, and compact dirt to the Midland County Horseshoe for the purpose of creating an Amphitheater, according to the attached design.

SUBCONTRACTOR AND/OR SUPPLIER IDENTIFICATION:
Should the Bidder subcontract any work, the Bidder shall indicate below the name of each subcontractor and/or supplier the bidder will use in the performance of the contract. The Bidder shall specify the work to be performed by the subcontractor or the materials to be provided by the supplier. Any changes in subcontractor and/or supplier listed below shall require prior approval by the Purchasing Office.

Vendors shall also verify that the Vendor can and will deliver the performance and payment bonds referred to below. In the event that a Vendor cannot make this verification, this may be grounds to reject the Vendor.

CONSTRUCTION LOCATION:
The Amphitheater is designed to be east of the Midland County Horseshoe Pavilion.

SPECIFICATIONS:
- Grade and remove organic material already on site.
- Need approximately 32,000 cubic tight yards of dirt. The exact number will need to be determined by the Vendor.
- Owner will provide approximately 22,000 cubic tight yards of dirt; this dirt is available in an existing berm on the property but will need to be moved to the correct location. A topographical survey is included, see ATTACHMENT B. An earthwork specification for this stockpile can be found in the letter from RRC in ATTACHMENT D.
- All dirt will need to be moved to the Amphitheater location.
- All dirt will need to be compacted and shaped according to the design documents provided by Vandergriff and Dunaway, see ATTACHMENT C and ATTACHMENT D.
- All work is to be completed by March 4, 2016. If work is not completed by deadline, $250 in liquid damages will be sought.
EVALUATION PROCESS:
The County will award to the bidder that submits a bid which represents the “best value” to the County. The best value shall not be based solely upon price but the bid which receives the highest cumulative score for each of the evaluation factors delineated herein.

CRITERIA:
Completed Proposal Form, see section 00 42 00 of ATTACHMENT D, is required.

Tab 1 Previous Related Experience: (15 points, maximum)
- Indicate experience with publicly funded facilities of same approximate size and type as the anticipated project.
- Indicate safety record on previous projects.
- Indicate whether Vendor has had similar contracts terminated prior to completion or whether a bonding company surety has had to pay funds under a bond of the Vendor.

Tab 2 Identity and Location of Vendor: (10 points, maximum)
- Indicate the exact legal name of Vendor, its type of legal organization, its State of organization, its mailing address, the office/business location of the Vendor from which the Project will be managed; and, address Vendor’s availability to the Project and the County and the response time.

Tab 3 Personnel: (15 points, maximum)
- Indicate the superintendent of this project.

Tab 4 References: (Include name, address, and phone number of contact): (10 points, maximum)
- Indicate (3 minimum) general references who can attest to the Vendor’s ability, performance, and safety record.
- Indicate (3 minimum) contractor references who can attest to the Vendor’s abilities in handling construction management.

Tab 7 Cost: (50 points, maximum)
- Indicate the Vendor’s proposed fee for the dirt as well as the hauling and shaping services.
- Pricing MUST include $15,000.00 contingency allowance.
AGREEMENT made as of the ___ day of ___ in the year
(In words, indicate day, month and year.)

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

MIDLAND COUNTY
500 N. Lorraine Street
Suite 1100
Midland, Texas 79701

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

To Be Determined

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

MIDLAND COUNTY AMPHITHEATER - Dirt Work Package
2514 Arena Trail
Midland, Texas 79701

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

DUNAWAY ASSOCIATES, L.P.
4000 N. Big Spring Street, Suite 101
Midland, Texas 79705
Telephone Number: (432) 699-4889

The Owner and Contractor agree as follows.

That Midland County shall provide:

1. Approximately 22,000 cubic yards (tight yards) of fill material located on County property south of the Horseshoe Pavilion.

2. Non potable water for moisture and requirements for fill compaction as specified.

3. Electrical power adjacent to job site.

4. Construction toilets, as necessary.
TABLE OF ARTICLES

1. THE WORK OF THIS CONTRACT
2. DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
3. CONTRACT SUM
4. PAYMENT
5. DISPUTE RESOLUTION
6. ENUMERATION OF CONTRACT DOCUMENTS
7. GENERAL PROVISIONS
8. OWNER
9. CONTRACTOR
10. ARCHITECT
11. SUBCONTRACTORS
12. CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
13. CHANGES IN THE WORK
14. TIME
15. PAYMENTS AND COMPLETION
16. PROTECTION OF PERSONS AND PROPERTY
17. INSURANCE & BONDS
18. CORRECTION OF WORK
19. MISCELLANEOUS PROVISIONS
20. TERMINATION OF THE CONTRACT
21. CLAIMS AND DISPUTES

ARTICLE 1 THE WORK OF THIS CONTRACT
The Contractor shall execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 2 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
§ 2.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.
(Insert the date of commencement, if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

January 12, 2016
§ 2.2 The Contract Time shall be measured from the date of commencement.

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

<table>
<thead>
<tr>
<th>March 4, 2016</th>
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<tbody>
<tr>
<td>Portion of Work</td>
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</table>

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

ARTICLE 3 CONTRACT SUM
§ 3.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor’s performance of the Contract. The Contract Sum shall be one of the following:
(Recheck appropriate box.)

[ ] Stipulated Sum, in accordance with Section 3.2 below
[ ] Cost of the Work plus the Contractor's Fee, in accordance with Section 3.3 below
[ ] Cost of the Work plus the Contractor’s Fee with a Guaranteed Maximum Price, in accordance with Section 3.4 below

(Based on the selection above, complete Section 3.2, 3.3 or 3.4 below.)

§ 3.2 The Stipulated Sum shall be (Bid Price), subject to additions and deductions as provided in the Contract Documents.

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

A. Performance and Payment Bonds – Add Alternate #1

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

<table>
<thead>
<tr>
<th>Item</th>
<th>Units and Limitations</th>
<th>Price Per Unit ($0.00)</th>
</tr>
</thead>
</table>

§ 3.2.3 Allowances included in the stipulated sum, if any:
(Identify allowance and state exclusions, if any, from the allowance price.)

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<tr>
<th>Item</th>
<th>Allowance</th>
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<tbody>
<tr>
<td>Contingency</td>
<td>$15,000.00 (Fifteen Thousand Dollars)</td>
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</tbody>
</table>

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User Notes:
ARTICLE 4  PAYMENTS

§ 4.1 PROGRESS PAYMENTS

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

§ 4.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month.

§ 4.1.3 Provided that an Application for Payment is received by the Architect not later than the first business day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the 30 days following receipt. If an Application for Payment is received by the Architect after the date fixed above, payment shall be made by the Owner not later than 30 business days after the Architect receives the Application for Payment. (Federal, state or local laws may require payment within a certain period of time.)

§ 4.1.4 Retainage, if any, shall be withheld as follows:

- Five Percent (5%) per Pay Application.

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

§ 4.2 FINAL PAYMENT

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

.1 the Contractor has fully performed the Contract except for the Contractor’s responsibility to correct Work as provided in Section 18.2, and to satisfy other requirements, if any, which extend beyond final payment;

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

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

ARTICLE 5  DISPUTE RESOLUTION

§ 5.1 BINDING DISPUTE RESOLUTION

For any claim subject to, but not resolved by, mediation pursuant to Section 21.3, the method of binding dispute resolution shall be as follows:

(Insert method of binding dispute resolution method other than litigation, claims will be resolved in a court of competent jurisdiction.)

[ ] Arbitration pursuant to Section 21.4 of this Agreement

[ ] Litigation in a court of competent jurisdiction in Texas

[ ] Other (Specify)
ARTICLE 6 ENUMERATION OF CONTRACT DOCUMENTS
§ 6.1 The Contract Documents are defined in Article 7 and, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 6.1.1 The Agreement is this executed AIA Document A107-2007, Standard Form of Agreement Between Owner and Contractor for a Project of Limited Scope.

§ 6.1.2 The Supplementary and other Conditions of the Contract:

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<thead>
<tr>
<th>Document</th>
<th>Title</th>
<th>Date</th>
<th>Pages</th>
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§ 6.1.3 The Specifications:

(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

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<tr>
<th>Section</th>
<th>Title</th>
<th>Date</th>
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<td>Electronic Data Transfer &amp; Indemnification Agreement</td>
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<td>Optional Product / System Comparison</td>
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§ 6.1.4 The Drawings:
(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

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Portions of Addenda relating to bidding requirements are not part of the Contract Documents unless the bidding requirements are enumerated in this Article 6.

§ 6.1.5 The Addenda, if any:

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<td>3</td>
<td>12/14/2015</td>
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</table>

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

.1 Exhibit A, Determination of the Cost of the Work, if applicable.
.2 AIA Document E201™-2007, Digital Data Protocol Exhibit, if completed, or the following:

.3 Other documents:
(List here any additional documents that are intended to form part of the Contract Documents.)

ARTICLE 7 GENERAL PROVISIONS

§ 7.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in Article 6 and consist of this Agreement (including, if applicable, Supplementary and other Conditions of the Contract), Drawings, Specifications, Addenda issued prior to the execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 7.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be
construed to create a contractual relationship of any kind between any persons or entities other than the Owner and the Contractor.

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

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

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

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

§ 7.6 TRANSMISSION OF DATA IN DIGITAL FORM
If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmission, unless otherwise provided in the Agreement or in the Contract Documents.

ARTICLE 8  OWNER
§ 8.1 INFORMATION AND SERVICES REQUIRED OF THE OWNER
§ 8.1.1 The Owner shall furnish all necessary surveys and a legal description of the site.

§ 8.1.2 The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 8.1.3 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 9.6.1, the Owner shall secure and pay for other necessary approvals, easements, assessments and charges required for the construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 8.2 OWNER'S RIGHT TO STOP THE WORK
If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents, or repeatedly fails to carry out the Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order is eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity.

§ 8.3 OWNER'S RIGHT TO CARRY OUT THE WORK
If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents, and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner, without prejudice to any other remedy the Owner may
have, may correct such deficiencies and may deduct the reasonable cost thereof, including Owner's expenses and compensation for the Architect's services made necessary thereby, from the payment then or thereafter due the Contractor.

ARTICLE 9 CONTRACTOR
§ 9.1 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR
§ 9.1.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 9.1.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 8.1.1, shall take field measurements of any existing conditions related to that portion of the Work and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies, or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional unless otherwise specifically provided in the Contract Documents.

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

§ 9.2 SUPERVISION AND CONSTRUCTION PROCEDURES
§ 9.2.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures, and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters.

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

§ 9.3 LABOR AND MATERIALS
§ 9.3.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

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

§ 9.3.3 The Contractor may make a substitution only with the consent of the Owner, after evaluation by the Architect and in accordance with a Modification.

§ 9.4 WARRANTY
The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation or normal wear and tear under normal usage.
§ 9.5 TAXES
The County is a tax exempt entity and shall supply the Contractor a Tax Exemption Certificate.

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

§ 9.6.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work. If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 9.7 ALLOWANCES
The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. The Owner shall select materials and equipment under allowances with reasonable promptness. Allowance amounts shall include the costs to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts. Allowance amounts shall not include the Contractor’s costs for unloading and handling at the site, labor, installation, overhead, and profit.

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

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

§ 9.9 SUBMITTALS
§ 9.9.1 The Contractor shall review for compliance with the Contract Documents and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in coordination with the Contractor’s construction schedule and in such sequence as to allow the Architect reasonable time for review. By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them; (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so; and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents. The Work shall be in accordance with approved submittals.

§ 9.9.2 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents.

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

§ 9.11 CUTTING AND PATCHING
The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly.
§ 9.12 CLEANING UP
The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus material from and about the Project.

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

§ 9.14 ACCESS TO WORK
The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 9.15 INDEMNIFICATION
§ 9.15.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 9.15.1.

§ 9.15.2 In claims against any person or entity indemnified under this Section 9.15 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 9.15.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 10 ARCHITECT
§ 10.1 The Architect will provide administration of the Contract and will be an Owner's representative during construction, until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified in writing in accordance with other provisions of the Contract.

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

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

§ 10.5 The Architect has authority to reject Work that does not conform to the Contract Documents and to require inspection or testing of the Work.

§ 10.6 The Architect will review and approve or take other appropriate action upon the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concepts expressed in the Contract Documents.

§ 10.7 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect will make initial decisions on all claims, disputes and other matters in question between the Owner and Contractor but will not be liable for results of any interpretations or decisions rendered in good faith.

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

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

ARTICLE 11 SUBCONTRACTORS
§ 11.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site.

§ 11.2 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of the Subcontractors or suppliers for each of the principal portions of the Work. The Contractor shall not contract with any Subcontractor or supplier to whom the Owner or Architect has made reasonable written objection within ten days after receipt of the Contractor's list of Subcontractors and suppliers. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 11.3 Contracts between the Contractor and Subcontractors shall (1) require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by the Contract Documents, assumes toward the Owner and Architect, and (2) allow the Subcontractor the benefit of all rights, remedies and redress against the Contractor that the Contractor, by these Contract Documents, has against the Owner.

ARTICLE 12 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
§ 12.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under conditions of the contract identical or substantially similar to these, including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such claim as provided in Article 21.

§ 12.2 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's activities with theirs as required by the Contract Documents.
§ 13.3 The Architect will have authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be effected by written order and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly.

§ 13.4 If concealed or unknown physical conditions are encountered at the site that differ materially from those indicated in the Contract Documents or from those conditions ordinarily found to exist, the Contract Sum and Contract Time shall be equitably adjusted as mutually agreed between the Owner and Contractor, provided that the Contractor provides notice to the Owner and Architect promptly and before conditions are disturbed.

ARTICLE 14 TIME
§ 14.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

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

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

§ 14.4 The date of Substantial Completion is the date certified by the Architect in accordance with Section 15.4.3.

§ 14.5 If the Contractor is delayed at any time in the commencement or progress of the Work by changes ordered in the Work, by labor disputes, fire, unusual delay in deliveries, abnormal adverse weather conditions not reasonably anticipatable, unavoidable casualties or any causes beyond the Contractor’s control, or by other causes which the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine, subject to the provisions of Article 21.

ARTICLE 15 PAYMENTS AND COMPLETION
§ 15.1 APPLICATIONS FOR PAYMENT
§ 15.1.1 Where the Contract is based on a Stipulated Sum or the Cost of the Work with a Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values, allocating the entire Contract Sum to the various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used in reviewing the Contractor's Applications for Payment, using AIA Document G702.
§ 15.1.3 Payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment stored, and protected from damage, off the site at a location agreed upon in writing.

§ 15.1.4 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor’s knowledge, information and belief, be free and clear of liens, claims, security interests or other encumbrances adverse to the Owner’s interests.

§ 15.2 CERTIFICATES FOR PAYMENT

§ 15.2.1 The Architect will, within seven days after receipt of the Contractor’s Application for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect’s reasons for withholding certification in whole or in part as provided in Section 15.2.3.

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

§ 15.2.3 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect’s opinion the representations to the Owner required by Section 15.2.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 15.2.1. If the Contractor and the Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect’s opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 9.2.2, because of

1. defective Work not remedied;
2. third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
3. failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
4. reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
5. damage to the Owner or a separate contractor;
6. reasonable evidence that the Work will not be completed within the Contract Time and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay, or
7. repeated failure to carry out the Work in accordance with the Contract Documents.

§ 15.2.4 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.
§ 15.3 PROGRESS PAYMENTS
§ 15.3.1 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor’s portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to sub-subcontractors in similar manner.

§ 15.3.2 Neither the Owner nor Architect shall have an obligation to pay or see to the payment of money to a Subcontractor except as may otherwise be required by law.

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

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

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

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

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

§ 15.5 FINAL COMPLETION AND FINAL PAYMENT
§ 15.5.1 Upon receipt of the Contractor’s written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect’s knowledge, information and belief, and on the basis of the Architect’s on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect’s final Certificate for Payment will constitute a further representation that conditions stated in Section 15.5.2 as precedent to the Contractor’s being entitled to final payment have been fulfilled.

§ 15.5.2 Final payment shall not become due until the Contractor has delivered to the Owner a complete release of all liens arising out of this Contract or receipts in full covering all labor, materials and equipment for which a lien could be filed, or a bond satisfactory to the Owner to indemnify the Owner against such lien. If any lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including costs and reasonable attorneys’ fees.

§ 15.5.3 The making of final payment shall constitute a waiver of claims by the Owner except those arising from:
.1 liens, claims, security interests or encumbrances arising out of the Contract and unsettled;
.2 failure of the Work to comply with the requirements of the Contract Documents, or
.3 terms of special warranties required by the Contract Documents.
§ 15.5.4 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 16 PROTECTION OF PERSONS AND PROPERTY

§ 16.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to:

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

The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons and property and their protection from damage, injury or loss. The Contractor shall promptly remedy damage and loss to property caused in whole or in part by the Contractor, a Subcontractor, a sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 16.1.2 and 16.1.3, except for damage or loss attributable to acts or omissions of the Owner or Architect or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor’s obligations under Section 9.15.

§ 16.2 HAZARDOUS MATERIALS

§ 16.2.1 The Contractor is responsible for compliance with the requirements of the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents, and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor’s reasonable additional costs of shutdown, delay and start-up.

§ 16.2.2 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect’s consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys’ fees, arising out of or resulting from performance of the Work in the affected area, if in fact, the material or substance presents the risk of bodily injury or death as described in Section 16.2.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

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

ARTICLE 17 INSURANCE AND BONDS

§ 17.1 The Contractor shall purchase, from, and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, insurance for protection from claims under workers’ compensation acts and other employee benefit acts which are applicable, claims for damages because of bodily injury, including death, and claims for damages, other than to the Work itself, to property which may arise out of or result from the Contractor’s operations and completed operations under the Contract, whether such operations be by the
Contractor or by a Subcontractor or anyone directly or indirectly employed by any of them. This insurance shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater, and shall include contractual liability insurance applicable to the Contractor's obligations under Section 9.15. Certificates of Insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work. Each policy shall contain a provision that the policy will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. The Contractor shall cause the commercial liability coverage required by the Contract Documents to include: (1) the Owner, the Architect and the Architect's Consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Contractor as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 17.2 OWNER'S LIABILITY INSURANCE

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

§ 17.3 PROPERTY INSURANCE

§ 17.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance on an "all-risk" or equivalent policy form, including builder's risk, in the amount of the initial Contract Sum, plus the value of subsequent modifications and cost of materials supplied and installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 15.5 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 17.3.1 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and sub-subcontractors in the Project.

§ 17.3.2 The Owner shall file a copy of each policy with the Contractor before an exposure to loss may occur. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 17.3.3 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 12, if any, and any of their subcontractors, sub-subcontractors, agents and employees for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to Section 17.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 12, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

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

§ 17.4 PERFORMANCE BOND AND PAYMENT BOND

§ 17.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.
§ 18.1 The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect’s services and expenses made necessary thereby, shall be at the Contractor’s expense, unless compensable under Section A.2.7.3 in Exhibit A, Determination of the Cost of the Work.

§ 18.2 In addition to the Contractor’s obligations under Section 9.4, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 15.4.3, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty.

§ 18.3 If the Contractor fails to correct nonconforming Work within a reasonable time, the Owner may correct it in accordance with Section 8.3.

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

§ 18.5 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Article 18.

ARTICLE 19 MISCELLANEOUS PROVISIONS

§ 19.1 ASSIGNMENT OF CONTRACT

Neither party to the Contract shall assign the Contract without written consent of the other, except that the Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project if the lender assumes the Owner’s rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 19.2 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located, except that if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 21.4.

§ 19.3 TESTS AND INSPECTIONS

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

§ 19.4 COMMENCEMENT OF STATUTORY LIMITATION PERIOD

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of
the final dispute resolution method selected in the Agreement within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 19.4.

ARTICLE 20 TERMINATION OF THE CONTRACT

§ 20.1 TERMINATION BY THE CONTRACTOR
If the Architect fails to certify payment as provided in Section 15.2.1 for a period of 30 days through no fault of the Contractor, or if the Owner fails to make payment as provided in Section 4.1.3 for a period of 30 days, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 20.2 TERMINATION BY THE OWNER FOR CAUSE

§ 20.2.1 The Owner may terminate the Contract if the Contractor
.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of a public authority; or
.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 20.2.2 When any of the above reasons exists, the Owner, upon certification by the Architect that sufficient cause exists to justify such action, may, without prejudice to any other remedy the Owner may have and after giving the Contractor seven days' written notice, terminate the Contract and take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor and may finish the Work by whatever reasonable method the Owner may deem expedient. Upon request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 20.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 20.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

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

§ 20.3 TERMINATION BY THE OWNER FOR CONVENIENCE
The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause. The Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 21 CLAIMS AND DISPUTES

§ 21.1 Claims, disputes and other matters in question arising out of or relating to this Contract, including those alleging an error or omission by the Architect but excluding those arising under Section 16.2, shall be referred initially to the Architect for decision. Such matters, except those waived as provided for in Section 21.8 and Sections 15.5.3 and 15.5.4, shall, after initial decision by the Architect or 30 days after submission of the matter to the Architect, be subject to mediation as a condition precedent to binding dispute resolution.

§ 21.2 If a claim, dispute or other matter in question relates to or is the subject of a mechanic's lien, the party asserting such matter may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

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

§ 21.4 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any claim, subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association, in accordance with the Construction Industry Arbitration Rules in effect on the date of this Agreement. Demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

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

§ 21.6 Any party to an arbitration may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of a Claim not described in the written Consent.

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

§ 21.8 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.
.3 liquidated damages beyond the Contract completion date shall equal $500.00 (Five Hundred Dollars) per calendar day.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party’s termination in accordance with Article 20. Nothing contained in this Section 21.8 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

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

OWNER (Signature)  
Mike Bradford, County Judge  
(Printed name and title)

CONTRACTOR (Signature)  
(Printed name and title)
MIDLAND COUNTY AMPHITHEATER
EXISTING STOCK PILE
COUNTY OF MIDLAND, TEXAS
Plans for the Construction of

PHASE I GRADING & DRAINAGE IMPROVEMENTS
To Serve
MIDLAND COUNTY AMPHITHEATER

OWNER/DEVELOPER:
MIDLAND COUNTY
MIDLAND, TEXAS

ENGINEER:
DUNAWAY ASSOCIATES L.P.
4000 N. BIG SPRING STREET, SUITE 101
MIDLAND, TEXAS 79705
PHONE: (432) 699-4889
CONTACT: BRETT STEPHENS

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DECEMBER 2015
Project Manual

Midland County Amphitheatre
2514 Arena Trail
Midland, Texas 79706

December 14, 2015

VGA Project #: 01515

SET # __________________

VANDERGRIFF GROUP
ARCHITECTS • PC
312 N. BIG SPRING, SUITE 100  (432) 687-0781  MIDLAND, TEXAS
VGA@Vandergriff-Group.com
VANDERGRIFF GROUP ARCHITECTS, PC – PROJECT NO. 01515

Date: December 14, 2015

PROJECT MANUAL FOR:

Midland County Amphitheatre
2514 Arena Trail
Midland, Texas 79706

ARCHITECT OF RECORD:

Mark R. Pelletier, AIA
VANDERGRIFF GROUP ARCHITECTS, PC
312 N. Big Spring Street, Suite 100 Midland, Texas 79701
(432) 687-0781
(432) 687-5205 fax
Divisions 0 through 1

CONSULTING CIVIL ENGINEER:

Brooks I. Baca, P.E.
DUNAWAY ASSOCIATES, LP
4000 N. Big Spring Street, Suite 101
Midland, Texas 79705
(432) 699-4889
Divisions 2
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LIST OF DRAWINGS INCLUDED

The following drawings indicate the Work to be performed under this Contract and are made part of these Specifications.

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AVAILABLE INFORMATION

PART 1 – GENERAL

1.01 EARTHWORK SPECIFICATION

A. Each bidder shall be fully familiar with the following documents that have been prepared for the Owner by his separate consultants.

B. Earthwork Specification
   1. Prepared by: RRC
   2. Project Number: wt1510228
   3. Titled: Earthwork Specifications

C. The above documents are offered solely for reference and are intended to be part of the Contract Documents. The referenced documents are attached, following this Section. In preparing his bid, each bidder shall consider and evaluate the data contained in the referenced documents as well as the Drawings and Project Manual prepared by the Architect.

D. Concrete Substructures
   1. Prepared by: Texas Department of Transportation
   2. Titled: Concrete Substructures
   3. Dated: December 14, 2015

E. Hydraulic Cement Concrete
   1. Prepared by: Texas Department of Transportation
   2. Titled: Hydraulic Cement Concrete
   3. Dated: December 14, 2015

F. Reinforcement for Concrete
   1. Prepared by: Texas Department of Transportation
   2. Titled: Reinforcement for Concrete
   3. Dated: December 14, 2015

G. Headwalls and Wingwalls
   1. Prepared by: Texas Department of Transportation
   2. Titled: Headwalls and Wingwalls
   3. Dated: December 14, 2015

G. Concrete Headwalls
   1. Prepared by: Texas Department of Transportation
   2. Titled: Concrete Headwalls
   3. Dated: December 14, 2015

END OF SECTION 00 30 00
December 14, 2015
Via email: BStephens@dunaway-assoc.com

Mr. Brett Stephens, PE
Dunaway Associates, LP
4000 N. Big Spring Street, Suite 101
Midland, Texas 79705

Re: Earthwork Specifications
Horseshoe Amphitheater - Midland, Texas
RRC Project No. wt1510228

Dear Mr. Stephens:

The intent of this letter is to provide earthwork specifications for construction of the amphitheater. This letter also addresses settlement potentials of the amphitheater. RRC understands that this amphitheater will consist of a large earthen berm with a planned height of about 20 feet above surrounding grade. The berm will be contoured to allow pedestrian access and views overlooking a stage at the existing Horseshoe building. The amphitheater will mostly be grassy and concrete sidewalks will provide walkways. No other significant structures are planned on the amphitheater.

Earthwork Recommendation
The exterior 2-foot layer of the berm should consist of soils with sufficient cohesion to deter erosion. The surficial layer of soil should also consist of suitable topsoil that can support the planned vegetation. Client should obtain the advice of a landscape professional for specifications regarding topsoil.

The core of the berm may consist of most any material (rubble, gravel, or cobbles with sufficient soil fines) that can be compacted to deter the formation of voids. We understand that the berm will be constructed in single layers of fill across the entire footprint. It is possible to change fill materials as the berm increases in elevation. RRC’s recommendations below are appropriate for soil fill only. Different specifications will be necessary if rubble or cobbles/boulders are included.

Earthen fill for the amphitheater berm shall consist of soils that meet one of the following classifications: SC, Sandy CL, or CL. Any of these soils may also possess up to 30% gravel content. The intent is to use a fine-grained cohesive soil that will deter erosion and support a 33% slope along the steeper sides of the berm. Following are material specifications appropriate for all berm soils:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasticity Index</td>
<td>7 – 18</td>
</tr>
<tr>
<td>Passing 9-inch sieve</td>
<td>100%</td>
</tr>
<tr>
<td>Passing #4 sieve</td>
<td>70% minimum</td>
</tr>
<tr>
<td>Passing #200 sieve</td>
<td>20% - 90%</td>
</tr>
</tbody>
</table>
Each fill lift across the berm should be compacted in maximum 12-inch thick lifts. In order to compact this thickness, the contractor must use a sheeps-foot compactor with padded feet that have a minimum length of 4-inches. If the compactor has pads less than 4-inches, then the maximum lift thickness is 8-inches. Verify compaction using a nuclear density gauge and test the full lift thickness. RRC recommends density tests with a frequency of one per 5,000 sq.ft.

Compact fill soils to a minimum compaction of 93% per ASTM D698. Moisture content at the time of compaction should be +1% to -5% of optimum.

**Proposed Fill from Nearby Stockpile**
RRC obtained a bulk sample from a stockpile of soil located southeast of the Horseshoe facility. We conducted soil classification tests in order to assess if this stockpile is a suitable for the berm. Laboratory tests indicate that this soil is a clayey sand (SC) soil with a fine grain texture. Atterberg Limits tests indicate that this soil has a Plasticity Index (PI) of 9 with a liquid limit of 22. A full report with lab test results is attached. These physical characteristics are ideal as general fill for this project. RRC does not make any statement as to whether this material will support the planned vegetation.

**Settlement Potentials**
Hamilton Engineering, Inc., conducted a geotechnical study in 2012 for the main Horseshoe building. The amphitheater will be located immediately east of this building. Boreholes B3, B4, and B5 were situated at the location of the amphitheater. RRC reviewed these bore logs. These bore logs indicate that native soils under the amphitheater consist of 1.5 to 4 feet of medium dense sandy clay and clayey sand. This surficial soil is very stiff and in an over-consolidated state. The second soil layer consists of caliche that extends to at least 20 feet deep. This caliche is very dense and cemented to a soft sandstone. Overall, this soil profile indicates a low settlement potential under the 20-foot tall berm. Because the berm will be situated at least 40-feet east of the Horseshoe building, any consolidation under the berm should in no way affect the existing building.

The compacted fill used to construct the berm should have a minimum compaction of 93%. Because there will not be any significant structures on the berm, settlement potentials are low due to a lack of overburden pressures. But calculating actual settlement potentials is not possible due to likely localized variations in earthwork, grading, and drainage. The only structures planned on the berm are concrete walkways. In order to avoid possible cracks in the sidewalk, RRC recommends avoiding concrete and using gravelly walkways or asphaltic concrete that can absorb small deflections without cracking.

**Pavement Between Berm and Building**
There will be concrete pavement situated between the amphitheater berm and the Horseshoe Building. This area should use typical construction specifications used for pavements. If none are already available, RRC recommends that pavement subgrade soils be compacted to at least 95% of ASTM D698 with moisture near optimum.

**Limitations and Closing**
RRC did not conduct a geotechnical phase study for this project. We reviewed a report from Hamilton Engineering and relied upon their soil bore logs. We also were not able to calculate settlement potentials for any fill soils other than those actually tested (see report attached). Lastly, RRC has no information regarding the volume of soils available in the stockpile of proposed fill. We also have no information about the dense state of the stockpile; therefore, RRC cannot make any estimation about the ‘compaction ratio’ as the material is removed from
the stockpile (loose state) and compacted into the berm (more dense state). But we do expect that there will be some reduction in volume from the stockpile to the berm.

We appreciate the opportunity to assist you with this project. If there are other items that require attention, please do not hesitate to ask. We look forward to working with you during construction.

Sincerely,

RRC Power & Energy, LLC

J. Edward Vasquez, PE
Associate Principal
To: Dunaway Associates, LP  
Attn: Mr. Brett Stephens, PE  
400 N. Big Spring St., Suite 101  
Midland, Texas 79705

Project: Horse Shoe Amphitheater  
Location: S. Garfield at Interstate 20  
Midland, Texas  
Project No.: wt150228

Date: December 14, 2015  
Report No.: 510228.1203.9150

Material Description: Brown Clayey Sand

Sample Location: Large Stockpile southwest of Horseshoe building

Date Sampled: 12/3/2015

Sampled By: J. Aguirre

Sample Number: S-3985

Test Method: ASTM D698 and D4718  
Standard Proctor with Aggregate Correction

Preparation Method: Moist  
Rammer: Mechanical  
Compaction Method: A

Oversize Sieve: No. 4
% By Weight Oversize: 17%
Bulk Specific Gravity: 2.213
Absorption: 6.4%

Compactor: Poog Engineering Co.
Identification No.: M100-210072016
Calibrated Date: February 4, 2015
Laboratory Manager: Johnny Franks

Test Method: ASTM C136 and C1140

Sieve Analysis

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>% Retained</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 3/4&quot;</td>
<td>0</td>
</tr>
<tr>
<td>7/8&quot;</td>
<td>4</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>9</td>
</tr>
<tr>
<td>No. 4</td>
<td>12</td>
</tr>
<tr>
<td>No. 40</td>
<td>19</td>
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<tr>
<td>No. 200</td>
<td>56.0</td>
</tr>
</tbody>
</table>

Test Method: ASTM D4318  
Atterberg Limits

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>LL</td>
<td>22</td>
</tr>
<tr>
<td>PL</td>
<td>13</td>
</tr>
<tr>
<td>PI</td>
<td>9</td>
</tr>
</tbody>
</table>

Soil Classification  
SC

LABORATORY COMPACTED SAMPLES (Finer Fraction)

Maximum Dry Unit Weight (pcf): 118.5  
Optimum Moisture Content (%): 12.0%

CORRECTED VALUE OF TOTAL SAMPLE (Agg. Correction)

Maximum Dry Unit Weight (pcf): 121.4  
Optimum Moisture Content (%): 11.1

Copies To: 1-Above

RRC Power & Energy, LLC

Quality Review

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The results shown on this report are for the exclusive use of the client for whom they were obtained and apply only to the sample tested and/ or inspected. They are not intended to be indicative of qualities of apparently identical products. The use of our name must receive prior written approval. Reports must be reproduced in their entirety. Unauthorized use or copying of this document is strictly prohibited by anyone other than the client for the specific project.
Item 420
Concrete Substructures

1. DESCRIPTION

Construct concrete substructures including footings, columns, caps, abutments, piers, culverts, other bridge substructure elements, and other concrete structures as indicated.

2. MATERIALS

2.1. Concrete. Provide concrete in accordance with Item 421, “Hydraulic Cement Concrete.” Provide the class of concrete for each type of structure or unit as shown on the plans or in pertinent governing specifications.

2.2. Grout or Mortar. Provide grout for dowelling anchors or precast connections in accordance with DMS-4675, “Cementitious Grouts and Mortars for Miscellaneous Applications.”

2.3. Latex Curing Materials. Provide an acrylic-polymer latex admixture (acrylic resin emulsion per DMS-4640, “Chemical Admixtures for Concrete”) suitable for producing polymer-modified concrete or mortar. Do not allow latex to freeze.

2.4. Reinforcing Steel. Provide reinforcing steel in accordance with Item 440, “Reinforcement for Concrete.”


- Provide preformed fiber expansion joint material that conforms to the dimensions shown on the plans.
- Provide preformed bituminous fiber material unless otherwise specified.
- Provide asphalt board that conforms to dimensions shown on the plans.
- Provide re-bonded neoprene filler that conforms to the dimensions shown on the plans.

2.6. Waterstop. Provide rubber or polyvinyl chloride (PVC) waterstops in accordance with DMS-6160, “Water Stops, Nylon Reinforced Neoprene Sheet, and Elastomeric Pads,” unless otherwise shown on the plans.

2.7. Curing Materials. Provide membrane curing compounds in accordance with DMS-4650, “Hydraulic Cement Concrete Curing Materials and Evaporation Retardants.”

Provide cotton mats that consist of a filling material of cotton “bat” or “bats” (at least 12 oz. per square yard) completely covered with unsized cloth (at least 6 oz. per square yard) stitched longitudinally with continuous parallel rows of stitching spaced at less than 4 in., or tuft both longitudinally and transversely at intervals less than 3 in. Provide cotton mats that are free from tears and in good general condition. Provide a flap at least 6 in. wide consisting of 2 thicknesses of the covering and extending along 1 side of the mat.

Provide polyethylene sheeting that is at least 4 mils thick and free from visible defects. Provide only clear or opaque white sheeting when the ambient temperature during curing exceeds 90°F or when applicable to control temperature during mass pours.

Provide burlap-polyethylene mats made from burlap impregnated on 1 side with a film of opaque white pigmented polyethylene, free from visible defects. Provide laminated mats that have at least 1 layer of an impervious material such as polyethylene, vinyl plastic, or other acceptable material (either as a solid sheet or impregnated into another fabric) and are free of visible defects.

Provide burlap material which complies with AASHTO M 182, Class 3 (10 oz. per square yard) with the following additions:
Manila hemp may also be used to make burlap.
- Do not use burlap fabricated from bags.
- Do not use burlap containing any water soluble ingredient which will retard the setting time of concrete.

Provide used burlap complying with the requirements stated above and that has only been used previously for curing concrete. "Like new" cleanliness is not expected, but contamination with any substance foreign to the concrete curing process, such as grease or oil, will be cause for rejection.

2.8. **Epoxy.** Provide epoxy materials in accordance with DMS-6100, "Epoxies and Adhesives," unless otherwise specified.

### 3. **EQUIPMENT**

3.1. **Transporting and Placing Equipment.** Use appropriate transporting and placing equipment such as buckets, chutes, buggies, belt conveyors, pumps, or other equipment as necessary. Ensure concrete is not transported or conveyed through equipment made of aluminum.

Use tremies to control the fall of concrete or for underwater placement. Use tremies that are watertight and of large enough diameter to allow the placement of the concrete but less than 14 in. in diameter. Construct the tremie so the bottom can be sealed and opened once the tremie has been fully charged with concrete for underwater placements.

Use pumps with lines at least 5 in. inside diameter (I.D.) where Grade 2 or smaller coarse aggregate is used, and at least 8 in. I.D. for Grade 1 coarse aggregate.

3.2. **Vibrators.** Use immersion-type vibrators for consolidation of concrete. Provide at least 1 standby vibrator for emergency use. Furnish vibrator head covered by a rubberized or elastomeric cover when used near epoxy coated reinforcing steel.

3.3. **Temperature Recording Equipment.** Use strip chart temperature recording devices, recording maturity meters in accordance with Tex-426-A, or other approved devices that are accurate to within ±2°F within the range of 32°F to 212°F for mass concrete operations, cold weather placements, and as otherwise specified.

3.4. **Artificial Heating Equipment.** Use artificial heating equipment as necessary for maintaining the concrete temperatures as specified in Section 420.4.7.11., "Placing Concrete in Cold Weather."

3.5. **Spraying Equipment.** Use mechanically powered pressure sprayers, either air or airless, with appropriate atomizing nozzles for the application of membrane curing. Use hand-pressurized spray equipment with 2 or 3 fan-spray nozzles if approved. Ensure the spray from each nozzle overlaps the spray from adjacent nozzles by approximately 50%.

3.6. **Concrete Testing Equipment.** Provide testing equipment for use by the Engineer in accordance with Section 421.3.3., "Testing Equipment."

### 4. **CONSTRUCTION**

Obtain approval for proposed construction methods before starting work. Approval of construction methods and equipment does not relieve the Contractor's responsibility for safety or correctness of methods, adequacy of equipment, or completion of work in full accordance with the Contract.

Unless otherwise shown on the plans, it is the Contractor's option to perform testing on structural concrete (structural classes of concrete are identified in Table 8 of Section 421.4.1., "Classification of Concrete Mix Designs.") to determine the in-situ strength to address the schedule restrictions in Section 420.4.1., "Schedule Restrictions." The Engineer may require the Contractor to perform this testing for concrete placed in cold weather. Make enough test specimens for Contractor-performed testing to ensure strength...
requirements are met for the operations listed in Section 420.4.1., "Schedule Restrictions." Make at least 1 set of test specimens for each element cast each day. Cure these specimens under the same conditions as the portion of the structure involved for all stages of construction. Ensure safe handling, curing, and storage of all test specimens. Provide testing personnel, and sample and test the hardened concrete in accordance with Section 421.4.8., "Sampling and Testing of Concrete." The maturity method, Tex-426-A, may be used for in-situ strength determination for schedule restrictions if approved. Coring will not be allowed for in-situ strength determination for schedule restrictions. Provide the Engineer the opportunity to witness all testing operations. Report all test results to the Engineer.

If the Contractor does not wish to perform schedule restriction testing, the Engineer’s 7-day lab-cured tests, performed in accordance with Article 421.5., "Acceptance of Concrete," will be used for schedule restriction determinations. The Engineer may require additional time for strength gain to account for field curing conditions such as cold weather.

4.1. **Schedule Restrictions.** Construct and open completed structures to traffic with the following limitations unless otherwise shown on the plans:

4.1.1. **Setting Forms.** Attain at least 2,500 psi compressive strength before erecting forms on concrete footings supported by piling or drilled shafts, or on individual drilled shafts. Erect forms on spread footings and culvert footings after the footing concrete has aged at least 2 curing days as defined in Section 420.4.10., "Curing Concrete." Place concrete only after the forms and reinforcing steel have been inspected by the Engineer.

Support tie beam or cap forms by falsework on previously placed tie beams only if the tie beam concrete has attained a compressive strength of 2,500 psi and the member is properly supported to eliminate stresses not provided for in the design. Maintain curing as required until completion of the curing period.

Place superstructure forms or falsework on the substructure only if the substructure concrete has attained a compressive strength of 3,000 psi.

4.1.2. **Removal of Forms and Falsework.** Keep in place weight-supporting forms and falsework for bridge components and culvert slabs until the concrete has attained a compressive strength of 2,500 psi in accordance with Section 420.4.11., "Removal of Forms and Falsework." Keep all forms for mass placements in place for 4 days following concrete placement unless otherwise approved based on the outcome of the heat control plan outlined in Section 420.4.7.14., "Mass Placements."

4.1.3. **Placement of Superstructure Members.** Erect or place superstructure members or precast substructure members only after the substructure concrete has attained a compressive strength of 3,000 psi.

4.1.4. **Opening to Traffic.** Direct traffic culverts may be opened to construction traffic when the design strength specified in Section 421.4.1., "Classification of Concrete Mix Design," has been attained if curing is maintained. Obtain approval before opening direct traffic culverts to the traveling public. Open other noncritical structural and nonstructural concrete for service upon the completion of curing unless otherwise specified or directed.

4.1.5. **Post-Tensioned Construction.** Ensure strength requirements on the plans for structural elements designed to be post-tensioned are met for stressing and staged loading of structural elements.

4.1.6. **Backfilling.** Backfill in accordance with Section 400.3.3., "Backfill."

4.2. **Plans for Falsework and Forms.** Submit plans for falsework and forms for the following items: vertical forms for piers and single column bents; load supporting forms for caps and tie-beams; form attachments for bridges to be widened; and other items as indicated or directed. Provide design calculations when requested. Show all essential details of proposed forms, falsework, and bracing. Have a licensed professional engineer design, seal, and sign these plans. Department approval is not required, except as noted in Table 1 of Item 5, "Control of the Work," when forms or falsework are located such that public safety can be affected, but the Department reserves the right to request modifications to the plans. The Contractor is responsible for the adequacy of these plans. Design job-fabricated formwork assuming a weight of 150 pcf for concrete, and
include a liveload allowance of 50 psf of horizontal surface of the form. Do not exceed 125% of the allowable stresses used by the Department for the design of structures.

4.3. **Falsework.** Design and construct falsework to safely carry the maximum anticipated loads, including wind loads, and to provide the necessary rigidity. Consult AASHTO’s *Guide Design Specifications for Bridge Temporary Works* and *Construction Handbook for Bridge Temporary Works* for falsework and shoring information not indicated below. Submit details in accordance with Section 420.4.2., “Plans for Falsework and Forms.”

Design job-fabricated falsework assuming a weight of 150 pcf for concrete, and include a minimum liveload allowance of 50 psf of horizontal surface of the form. Do not exceed 125% of the allowable stresses used by the Department for the design of structures.

Do not exceed the manufacturer’s maximum allowable working loads for moment and shear or end reaction for commercially produced structural units used in falsework. Include a minimum liveload allowance of 35 psf of horizontal form surface in determining the maximum allowable working load for commercially produced structural units.

Provide timber that is sound, in good condition, and free from defects that would impair its strength. Provide timber that meets or exceeds the species, size, and grade requirements in the submitted falsework plans.

Provide wedges made of hardwood or metal in pairs to adjust falsework to desired elevations to ensure even bearing. Do not use wedges to compensate for incorrectly cut bearing surfaces.

Use sills or grillages large enough to support the superimposed load without settlement. Take precautions to prevent settling of the supporting material unless the sills or grillages are founded on solid rock, shale, or other hard materials.

Place falsework that cannot be founded on a satisfactory spread footing on piling or drilled shafts with enough bearing capacity to support the superimposed load without settlement. Drive falsework piling to the required resistance determined by the applicable formula in Item 404, “Driving Piling.” Design drilled shafts for falsework to carry the superimposed load using both skin friction and point bearing.

Weld in conformance with Item 448, “Structural Field Welding.” Securely brace each falsework bent to provide the stiffness required, and securely fasten the bracing to each pile or column it crosses.

Remove falsework when it is no longer required or as indicated on the submitted falsework plan. Pull or cut off foundations for falsework at least 2 ft. below finished ground level. Completely remove falsework, piling, or drilled shafts in a stream, lake, or bay to the approved limits to prevent obstruction to the waterway.

4.4. **Forms.** Submit formwork plans in accordance with Section 420.4.2., “Plans for Falsework and Forms.”

4.4.1. **General.** Provide forms of either timber or metal except where otherwise specified or permitted.

Design forms for the pressure exerted by a liquid weighing 150 pcf. Take the rate of concrete placement into consideration in determining the depth of the equivalent liquid. Include a minimum liveload allowance of 50 psf of horizontal surface for job-fabricated forms. Do not exceed 125% of the Department's allowable stresses for the design of structures.

Do not exceed the manufacturer’s maximum allowable working loads for moment and shear or end reaction for commercially produced structural units used for forms. Include a minimum liveload allowance of 35 psf of horizontal form surface in determining the maximum allowable working load for commercially produced structural units.

Provide steel forms for round columns unless otherwise approved. Refer to Item 427, “Surface Finishes for Concrete,” for additional requirements for off-the-form finishes.
Provide commercial form liners for imprinting a pattern or texture on the concrete surface as shown on the plans and specified in Section 427.4.3.5., "Form Liner Finish."

Provide forming systems that are practically mortar-tight, rigidly braced, and strong enough to prevent bulging between supports, and maintain them to the proper line and grade during concrete placement. Maintain forms in a manner that prevents warping and shrinkage. Do not allow offsets at form joints to exceed 1/16 in.

Use only material that is inert, non-biodegradable, and nonabsorbent for forms to be left in place.

Construct all forms to permit their removal without marring or damaging the concrete. Clean all forms and footing areas of any extraneous matter before placing concrete. Provide openings in forms if needed for the removal of laitance or foreign matter.

Treat the facing of all forms with bond-breaking coating of composition that will not discolor or injuriously affect the concrete surface. Take care to prevent coating of the reinforcing steel.

Complete all preparatory work before requesting permission to place concrete.

Cease placement if the forms show signs of bulging or sagging at any stage of the placement, and remove the portion of the concrete causing this condition immediately as directed. Reset the forms and securely brace them against further movement before continuing the placement.

4.4.2. Timber Forms. Provide properly seasoned, good-quality lumber that is free from imperfections that would affect its strength or impair the finished surface of the concrete. Provide timber or lumber that meets or exceeds the requirements for species and grade in the submitted formwork plans.

Maintain forms or form lumber that will be reused so it stays clean and in good condition. Do not use any lumber that is split, warped, bulged, or marred, or that has defects in any way that will produce inferior work. Promptly remove such lumber from the work.

Provide form lining for all formed surfaces except:
- the inside of culvert barrels, inlets, manholes, and box girders;
- surfaces that are subsequently covered by backfill material or are completely enclosed; and
- any surface formed by a single finished board or by plywood.

Provide form lining of an approved type such as masonite or plywood. Do not provide thin membrane sheeting such as polyethylene sheets for form lining.

Use plywood at least 3/4 in. thick. Place the grain of the face plies on plywood forms parallel to the span between the supporting studs or joists unless otherwise indicated on the submitted form drawings.

Use plywood for forming surfaces that remain exposed that meets the requirements for B-B Plyform Class I or Class II Exterior of the U.S. Department of Commerce Voluntary Product Standard PS 1.

Space studs and joists so the facing form material remains in true alignment under the imposed loads.

Space wales closely enough to hold forms securely to the designated lines, scabbed at least 4 ft. on each side of joints to provide continuity. Place a row of wales near the bottom of each placement.

Place facing material with parallel and square joints, securely fastened to supporting studs.

Place forms with the form panels symmetrical (long dimensions set in the same direction) for surfaces exposed to view and receiving only an ordinary surface finish as defined in Section 420.4.13., "Ordinary Surface Finish." Make horizontal joints continuous.
Make molding for chamfer strips or other uses of materials of a grade that will not split when nailed and can be maintained to a true line without warping. Dress wood molding on all faces. Fill forms at all sharp corners and edges with triangular chamfer strips measuring 3/4 in. on the sides unless otherwise shown on the plans.

Use metal form ties of an approved type or a satisfactory substitute of a type that permits ease of removal of the metal to hold forms in place. Cut back wire ties at least 1/2 in. from the face of the concrete.

Use devices to hold metal ties in place that are able to develop the strength of the tie and adjust to allow for proper alignment.

 Entirely remove metal and wooden spreaders that separate the forms as the concrete is being placed.

Provide adequate clean-out openings for narrow walls and other locations where access to the bottom of the forms is not readily attainable.

4.4.3. **Metal Forms.** Requirements for timber forms regarding design, mortar-tightness, filleted corners, beveled projections, bracing, alignment, removal, reuse, and wetting also apply to metal forms except metal forms do not require lining unless specifically noted on the plans.

Use form metal thick enough to maintain the true shape without warping or bulging. Countersink all bolt and rivet heads on the facing sides. Design clamps, pins, or other connecting devices to hold the forms rigidly together and to allow removal without damage to the concrete. Use metal forms that present a smooth surface and line up properly. Keep metal free from rust, grease, and other foreign materials.

4.5. **Drains.** Install and construct weep holes and roadway drains as shown on the plans.

4.6. **Placing Reinforcement and Post-Tensioning.** Place reinforcement as provided in Item 440, “Reinforcement for Concrete.” Do not weld reinforcing steel supports to other reinforcing steel except where shown on the plans.

Place post-tensioning ducts, anchorages, and other hardware in accordance with the approved prestressing details and Item 426, “Post-Tensioning.” Keep ducts free of obstructions until all post-tensioning operations are complete.

4.7. **Placing Concrete.** Give the Engineer sufficient advance notice before placing concrete in any unit of the structure to permit the inspection of forms, reinforcing steel placement, and other preparations.

Do not place concrete when impending weather conditions would impair the quality of the finished work. Place concrete in early morning or at night or adjust the placement schedule for more favorable weather when conditions of wind, humidity, and temperature are such that concrete cannot be placed without the potential for weather-related distress.

Adequately illuminate the entire placement site as approved when mixing, placing, and finishing concrete in non-daylight hours.

Furnish adequate shelter to protect the concrete against damage from rainfall or freezing temperatures as outlined in this Item if changes in weather conditions require protective measures after work starts. Continue operations during rainfall only if approved. Use protective coverings for the material stockpiles. Cover aggregate stockpiles only to the extent necessary to control the moisture conditions in the aggregates.

Allow at least 1 curing day after the concrete has achieved initial set before placing strain on projecting reinforcement to prevent damage to the concrete.

4.7.1. **Placing Temperature.** Place concrete according to the following temperature limits for the classes of concrete defined in Section 421.4.1., “Classification of Concrete Mix Designs.”
Place Class C, F, H, K, or SS concrete only when its temperature at time of placement is between 50°F and 95°F. Increase the minimum placement temperature to 60°F if slag cement is used in the concrete.

Place Class S concrete, used in this item only as indicated for culvert top slabs, only when its temperature is between 50°F and 85°F. Increase the minimum placement temperature to 60°F if slag cement is used in the concrete.

Place Class A, B, and D concrete only when its temperature at the time of placement is greater than 50°F.

Place mass concrete in accordance with Section 420.4.7.14., "Mass Placements," only when its temperature at the time of placement is between 50°F and 75°F.

4.7.2. **Transporting Time.** Begin the discharge of concrete delivered in truck mixers within the times listed in Table 14 of Item 421, "Hydraulic Cement Concrete."

4.7.3. **Workability of Concrete.** Place concrete with a slump as specified in Section 421.4.2.5., "Slump." Water may be added to the concrete before discharging any concrete from the truck to adjust for low slump provided that the maximum mix design water–cement ratio is not exceeded. Mix concrete in accordance with Section 421.4.6., "Mixing and Delivering Concrete," after introduction of any additional water or chemical admixtures. Do not add water or chemical admixtures after any concrete has been discharged.

4.7.4. **Transporting Concrete.** Transport concrete by buckets, chutes, buggies, belt conveyors, pumps, or other methods.

Protect concrete transported by conveyors from sun and wind to prevent loss of slump and workability. Shade or wrap with wet burlap pipes through which concrete is pumped as necessary to prevent loss of slump and workability.

Arrange and use chutes, troughs, conveyors, or pipes so the concrete ingredients will not be separated. Terminate such equipment in vertical downspouts when necessary to prevent segregation. Extend open troughs and chutes, if necessary, down inside the forms or through holes left in the forms.

Keep all transporting equipment clean and free from hardened concrete coatings. Discharge water used for cleaning clear of the concrete.

4.7.5. **Preparation of Surfaces.** Thoroughly wet all forms and hardened concrete on which concrete is to be placed before placing concrete on them. Remove any remaining puddles of excess water before placing concrete. Provide surfaces that are in a moist, saturated surface-dry condition when concrete is placed on them.

Ensure the subgrade or foundation is moist before placing concrete on grade. Lightly sprinkle the subgrade if dry.

4.7.6. **Expansion Joints.** Construct joints and devices to provide for expansion and contraction in accordance with plan details.

Use light wire or nails to anchor any preformed fiber joint material to the concrete on 1 side of the joint.

Ensure finished joints conform to the plan details with the concrete sections completely separated by the specified opening or joint material.

Remove all concrete within the joint opening soon after form removal and again where necessary after surface finishing to ensure full effectiveness of the joint.

4.7.7. **Construction Joints.** A construction joint is the joint formed by placing plastic concrete in direct contact with concrete that has attained its initial set. Monolithic placement means the manner and sequence of concrete placing does not create a construction joint.
Make construction joints of the type and at the locations shown on the plans. Additional joints in other members are not permitted without approval. Place authorized additional joints using details equivalent to those shown on the plans for joints in similar locations.

Make construction joints square and normal to the forms unless otherwise required. Use bulkheads in the forms for all vertical joints.

Thoroughly roughen the top surface of a concrete placement terminating at a horizontal construction joint as soon as practical after initial set is attained.

Thoroughly clean the hardened concrete surface of all loose material, laitance, dirt, and foreign matter, and saturate it with water. Remove all free water and moisten the surface before concrete or bonding grout is placed against it. Ensure the surface of the existing concrete is in a saturated surface-dry condition (SSD) just before placing subsequent concrete. Wet the existing concrete by ponding water on the surface for 24 hr. before placing subsequent concrete. Use high-pressure water blasting if ponding is not possible to achieve SSD conditions 15 to 30 min. before placing the concrete. An SSD condition is achieved when the surface remains damp when exposed to sunlight for 15 min.

Draw forms tight against the existing concrete to avoid mortar loss and offsets at joints.

Bonding agents are not required unless indicated otherwise. Coat the joint surface with bonding mortar, grout, epoxy, or other material if a bonding agent is required as indicated on the plans. Provide Type V epoxy per DMS-6100, “Epoxies and Adhesives,” for bonding fresh concrete to hardened concrete. Place the bonding epoxy on a clean, dry surface, and place the fresh concrete while the epoxy is still tacky. Place bonding mortar or grout on a surface that is SSD, and place the concrete before the bonding mortar or grout dries. Place other bonding agents in accordance with the manufacturer’s recommendations.

4.7.8. **Handling and Placing.** Minimize segregation of the concrete and displacement of the reinforcement when handling and placing concrete. Produce a uniform, dense compact mass.

Ensure concrete free-falls no more than 5 ft. except in the case of drilled shafts, thin walls such as in culverts, or as allowed by other Items. Remove any hardened concrete splatter ahead of the plastic concrete.

Fill each part of the forms by depositing concrete as near its final position as possible. Do not deposit large quantities of concrete at 1 point and run or move the concrete along to fill the forms.

Deposit concrete in the forms in layers of suitable depth but no more than 36 in. deep unless otherwise permitted.

Avoid cold joints in a monolithic placement. Sequence successive layers or adjacent portions of concrete so they can be vibrated into a homogeneous mass with the previously placed concrete before it sets. Allow no more than 1 hr. to elapse between adjacent or successive placements of concrete when re-vibration of the concrete is shown on the plans except as otherwise allowed by an approved placing procedure. This time limit may be extended by 1/2 hr. if the concrete contains at least the minimum recommended dosage of a Type B or D admixture.

4.7.9. **Consolidation.** Carefully consolidate concrete and flush mortar to the form surfaces with immersion type vibrators. Do not use vibrators that operate by attachment to forms or reinforcement except where approved on steel forms.

Vibrate the concrete immediately after deposit. Systematically space points of vibration to ensure complete consolidation and thorough working of the concrete around the reinforcement, embedded fixtures, and into the corners and angles of the forms. Insert the vibrators vertically where possible. Vibrate the entire depth of each lift, allowing the vibrator to penetrate several inches into the preceding lift. Do not use the vibrator to move the concrete to other locations in the forms. Do not drag the vibrator through the concrete. Thoroughly consolidate concrete along construction joints by operating the vibrator along and close to but not against the joint surface. Continue the vibration until the concrete surrounding reinforcements and fixtures is completely
consolidated. Hand-spade or rod the concrete if necessary to ensure flushing of mortar to the surface of all forms.

4.7.10. **Installation of Dowels and Anchor Bolts.** Install dowels and anchor bolts by casting them in-place or by grouting with grout, epoxy, or epoxy mortar unless noted otherwise. Form or drill holes for grouting. Follow the manufacturer’s recommended installation procedures for pre-packaged grout or epoxy anchor systems. Test anchors if required on the plans or by other items.

Drill holes for anchor bolts to accommodate the bolt embedment required by the plans. Make holes for dowels at least 12 in. deep unless otherwise shown on the plans. Make the hole diameter at least twice the dowel or bolt diameter, but not exceeding the dowel or bolt diameter plus 1-1/2 in. when using cementitious grout or epoxy mortar. Make the hole diameter 1/16 to 1/4 in. greater than the dowel or bolt diameter when using neat epoxy unless indicated otherwise by the epoxy manufacturer.

Thoroughly clean holes of all loose material, oil, grease, or other bond-breaking substance, and blow them clean with filtered compressed air. Use a wire brush followed by oil-free compressed air to remove all loose material from the holes, repeating as necessary until no more material is removed. Ensure holes are in a surface-dry condition when epoxy type materials are used and in a surface-moist condition when cementitious grout is used. Develop and demonstrate for approval a procedure for cleaning and preparing the holes for installation of the dowels and anchor bolts. Completely fill the void between the hole and dowel or bolt with grouting material. Follow exactly the requirements for cleaning outlined in the product specifications for pre-packaged systems.

Provide hydraulic cement grout for cast-in-place or grouted systems in accordance with DMS-4675, "Cementitious Grouts and Mortars for Miscellaneous Applications." Provide a Type III epoxy per DMS-6100, “Epoxies and Adhesives,” when neat epoxy is used for anchor bolts or dowels. Provide Type VIII epoxy per DMS-6100, “Epoxies and Adhesives,” when an epoxy grout is used. Provide grout, epoxy, or epoxy mortar as the binding agent unless otherwise indicated on the plans.

Provide other anchor systems as required on the plans.

4.7.11. **Placing Concrete in Cold Weather.** Protect concrete placed under weather conditions where weather may adversely affect results. Permission given by the Engineer for placing during cold weather does not relieve the Contractor of responsibility for producing concrete equal in quality to that placed under normal conditions. Remove and replace concrete as directed at the Contractor’s expense if it is determined unsatisfactory due to poor conditions.

Do not place concrete in contact with any material coated with frost or with a temperature of 32°F or lower. Do not place concrete when the ambient temperature in the shade is below 40°F and falling unless approved. Place concrete when the ambient temperature in the shade is at least 35°F and rising or above 40°F.

Provide and install recording thermometers, maturity meters, or other suitable temperature measuring devices to verify all concrete is effectively protected as follows:

- Maintain the temperature at all surfaces of concrete in bents, piers, culvert walls, retaining walls, parapets, wingwalls, top slabs of non-direct traffic culverts, and other similar formed concrete at or above 40°F for 72 hr. from the time of placement.
- Maintain the temperature of all other concrete, including the bottom slabs (footings) of culverts, placed on or in the ground above 32°F for 72 hr. from the time of placement.

Use additional covering, insulated forms, or other means and, if necessary, supplement the covering with artificial heating. Avoid applying heat directly to concrete surfaces. Cure as specified in Section 420.4.10., “Curing Concrete,” during this period until all requirements for curing have been satisfied.

Have all necessary heating and covering materials ready for use before permission is granted to begin placement when impending weather conditions indicate the possible need for temperature protection.
4.7.12. **Placing Concrete in Hot Weather.** Keep the concrete at or below the maximum temperature at time of placement as specified in Section 420.4.7.1., "Placing Temperature." Sprinkle and shade aggregate stockpiles or use ice, liquid nitrogen systems, or other approved methods as necessary to control the concrete temperature.

4.7.13. **Placing Concrete in Water.** Deposit concrete in water only when shown on the plans or with approval. Make forms or cofferdams tight enough to prevent any water current passing through the space in which the concrete is being deposited. Do not pump water during the concrete placing or until the concrete has set for at least 36 hr.

Place the concrete with a tremie or pump, or use another approved method, and do not allow it to fall freely through the water or disturb it after it is placed. Keep the concrete surface level during placement.

Support the tremie or operate the pump so that it can be easily moved horizontally to cover all the work area and vertically to control the concrete flow. Submerge the lower end of the tremie or pump hose in the concrete at all times. Use continuous placing operations until the work is complete.

Design the concrete mix in accordance with Item 421, "Hydraulic Cement Concrete," with a minimum cement content of 650 lb. per cubic yard for concrete to be placed under water. Include an anti-washout admixture in the mix design as necessary to produce a satisfactory finished product.

4.7.14. **Mass Placements.** Develop and obtain approval for a heat control plan for monolithic placements designated on the plans as mass concrete to ensure the following during the heat dissipation period:

- the temperature differential between the central core of the placement and the exposed concrete surface does not exceed 35°F and
- the temperature at the central core of the placement does not exceed 160°F.

Use the ConcreteWorks® software available from the Department, or another approved method based on the guidelines in ACI 207, "Mass Concrete," to develop the heat control plan. The Department will make available technical assistance on the use of ConcreteWorks®. Develop the heat control plan using historical temperature ranges for the anticipated time of the mass placement. Re-create the plan if the work schedule shifts by more than one month.

The heat control plan may include a combination of the following elements:

- selection of concrete ingredients including aggregates, gradation, and cement types, to minimize heat of hydration;
- use of ice or other concrete cooling ingredients;
- use of liquid nitrogen dosing systems;
- controlling rate or time of concrete placement;
- use of insulation or supplemental external heat to control heat loss;
- use of supplementary cementing materials;
- use of a cooling system to control the core temperature; or
- vary the duration formwork remains in place.

Furnish and install 2 pairs of temperature recording devices, maturity meters, or other approved equivalent devices. Install devices to measure the surface temperature no more than 3 in. from the surface. Install devices to measure the core temperature a distance of half the least dimension from the nearest surface near the point of maximum predicted heat. Use these devices to simultaneously measure the temperature of the concrete at the core and the surface. Maintain temperature control methods for 4 days unless otherwise approved based on the submitted heat control plan. Do not use maturity meters to predict strength of mass concrete. Revise the heat control plan as necessary to maintain the temperature limitations shown above.

If the core temperature exceeds 160°F, the mass concrete element will be subject to review and acceptance by the Engineer using forensic analyses to determine its potential reduction in service life or performance. Proceed with subsequent construction on the affected element only when notified regarding acceptance.
Repair any resulting cracking if the temperature differential between the central core of the placement and the nearest concrete surface exceeds 35°F at no expense to the Department and revise the heat control plan as necessary to prevent further occurrences.

4.7.15. **Placing Concrete in Foundation and Substructure.** Do not place concrete in footings until the depth and character of the foundation has been inspected and permission has been given to proceed.

Place concrete footings upon seal concrete after the cofferdams are free from water and the seal concrete is cleaned. Perform any necessary pumping or bailing during the concreting from a suitable sump located outside the forms.

Construct or adjust all temporary wales or braces inside cofferdams as the work proceeds to prevent unauthorized construction joints.

Omit forms when footings can be placed in a dry excavation without the use of cofferdams, if approved, and fill the entire excavation with concrete to the elevation of the top of footing.

Place concrete in columns monolithically between construction joints unless otherwise directed. Columns and caps or tie beams supported on them may be placed in the same operation or separately. Allow for settlement and shrinkage of the column concrete, if placed in the same operation, by placing it to the lower level of the cap or tie beam, and delay placement between 1 and 2 hr. before proceeding with the cap or tie beam placement.

4.7.16. **Placing Concrete in Box Culverts.** Allow between 1 and 2 hr. to elapse where the top slab and walls are placed monolithically in culverts more than 4 ft. in clear height before placing the top slab to allow for settlement and shrinkage in the wall concrete.

Accurately finish the footing slab at the proper time to provide a smooth uniform surface. Finish top slabs that carry direct traffic as specified in Item 422, "Concrete Superstructures." Give top slabs of fill type culverts a float finish.

4.8. **Extending Existing Substructures.** Verify pertinent dimensions and elevations of the existing structure before ordering any required materials.

4.8.1. **Removal.** Remove portions of the existing structure to the lines and dimensions shown on the plans or as directed. Dispose of these materials as shown on the plans or as directed. Repair any portion of the remaining structure damaged as a result of the construction.

Do not use explosives to remove portions of the existing structure unless approved in writing. Do not use a demolition ball, other swinging weight, or impact equipment unless shown on the plans. Use pneumatic or hydraulic tools for final removal of concrete at the "break" line. Use removal equipment, as approved that will not damage the remaining concrete.

4.8.2. **Reuse of Removed Portions of Structure.** Detach and remove all portions of the old structure that are to be incorporated into the extended structure to the lines and details as specified on the plans or as directed. Move the unit to be reused to the new location specified using approved methods. Place the reinforcement and extension concrete according to the plan details.

4.8.3. **Splicing Reinforcing Steel.** Splice new reinforcing bars to exposed bars in the existing structure using lap splices in accordance with Item 440, "Reinforcement for Concrete," unless otherwise shown on the plans. The new reinforcing steel does not need to be tied to the existing steel where spacing or elevation does not match that of the existing steel provided the lap length is attained. Weld in accordance with Item 448, "Structural Field Welding," when welded splices are permitted. Install any required dowels in accordance with Section 420.4.7.10., "Installation of Dowels and Anchor Bolts."

4.8.4. **Concrete Preparation.** Roughen and clean concrete surfaces that are in contact with new construction before placing forms. Prepare these construction joint surfaces in accordance with Section 420.4.7.7., "Construction Joints."
4.9. **Treatment and Finishing of Horizontal Surfaces.** Strike off to grade and finish all unformed upper surfaces. Do not use mortar topping for surfaces constructed under this Section.

Float the surface with a suitable float after the concrete has been struck off.

Slope the tops of caps and piers between bearing areas from the center slightly toward the edge, and slope the tops of abutment and transition bent caps from the backwall to the edge, as directed, so water drains from the surface. Give the concrete a smooth trowel finish. Construct bearing areas for steel units in accordance with Section 441.3.11.6., "Bearing and Anchorage Devices." Give the bearing area under the expansion ends of concrete slabs and slab and girder spans a steel-trowel finish to the exact grades required. Give bearing areas under elastomeric bearing pads or nonreinforced bearing seat buildups a textured, wood float finish. Do not allow the bearing area to vary from a level plane more than 1/16 in. in all directions.

Cast bearing seat buildups or pedestals for concrete units integrally with the cap or a construction joint. Provide a latex-based mortar, an epoxy mortar, or an approved proprietary bearing mortar for bearing seat buildups cast with a construction joint. Mix mortars in accordance with the manufacturer’s recommendations. Construct pedestals of Class C concrete, reinforced as shown on the plans or as indicated in Figure 1 and Figure 2. The Engineer of Record will design pedestals higher than 12 in.

![Figure 1](image)

**Figure 1**
Section through Bearing Seat Buildups
4.10. **Curing Concrete.** Obtain approval of the proposed curing methods, equipment, and materials before placing concrete. The Engineer may require the same curing methods for like portions of a single structure. Inadequate curing or facilities may delay all concrete placements on the job until remedial action is taken.

A curing day is a calendar day when the temperature, taken in the shade away from artificial heat, is above 50°F for at least 19 hr. or, on colder days if the temperature of all surfaces of the concrete is maintained above 40°F, for the entire 24 hr. The required curing period begins when all concrete has attained its initial set unless indicated otherwise. Tex-440-A may be used to determine when the concrete has attained its initial set.

Cure all concrete for 4 consecutive days except as allowed for the curing options listed below. Use form or membrane curing for vertical surfaces unless otherwise approved. Use only water curing for horizontal surfaces of HPC or mass concrete. Use water or membrane curing for horizontal or unformed surfaces for all other concrete.

Use one of the following curing options for vertical surfaces, unless indicated otherwise.

- Form cure for 48 hr. after placement.
- Form cure for 12 hr. after placement followed by membrane curing.
- For HPC Concrete, form cure for 48 hr. after placement followed by membrane curing.
- For mass concrete, form cure as required by the heat control plan followed by membrane curing if forms are removed before 4 days.

Apply membrane curing, if used, within 2 hr. of form removal.

Use only water curing in accordance with this Section for the top surface of any concrete unit upon which concrete is to be placed and bonded at a later interval (stub walls, caps with backwalls, risers, etc.).

Cure all other concrete as specified in the pertinent Items. Use the following methods for curing concrete, subject to the requirements of this Item.

4.10.1. **Form Curing.** When forms are left in intimate contact with the concrete, other curing methods are not required except for exposed surfaces and for cold weather protection. Use another approved curing method if forms are removed before the 4-day required curing period.
4.10.2. **Water Curing.** Keep all exposed surfaces of the concrete wet continuously for the required curing time. Use water curing in accordance with concrete mixing water in Section 421.2.5., “Water.” Do not use seawater or water that stains or leaves an unsightly residue.

4.10.2.1. **Blankets.** Keep the concrete continuously wet by maintaining wet cotton or burlap mats in direct contact with the concrete for the required curing time. Weight the mats adequately to provide continuous contact with all concrete. Cover surfaces that cannot be cured by direct contact with mats, forming an enclosure well anchored to the forms or ground so outside air cannot enter the enclosure. Provide sufficient moisture inside the enclosure to keep all surfaces of the concrete wet.

4.10.2.2. **Water Spray.** Overlap sprays or sprinklers to keep all uniform surfaces continuously wet.

4.10.2.3. **Ponding.** Cover the surfaces with at least 2 in. of clean granular material, kept wet at all times, or at least 1 in. deep water. Use a dam to retain the water or saturated granular material.

4.10.3. **Membrane Curing.** Choose either Type 1-D or Type 2 membrane-curing compound unless otherwise shown on the plans. Use the same type of curing compound on an individual member.

Apply membrane curing just after free moisture has disappeared at a rate of approximately 180 sq. ft. per gallon. Do not spray curing compound on projecting reinforcing steel or concrete that will later form a construction joint. Do not apply membrane curing to dry surfaces. Dampen formed surfaces and surfaces that have been given a first rub so they are moist at the time of application of the membrane.

Leave the film unbroken for the minimum curing period specified when membrane is used for complete curing. Correct damaged membrane immediately by reaplication of membrane. Polyethylene sheeting, burlap-polyethylene mats, or laminated mats in close contact with the concrete surfaces are equivalent to membrane curing.

4.11. **Removal of Forms and Falsework.** Remove forms for vertical surfaces after the concrete has aged a minimum of 12 hr. after initial set provided the removal can be done without damage to the concrete unless otherwise directed. Keep forms for mass placements in place for 4 days following concrete placement unless otherwise approved based on the outcome of the heat control plan outlined in Section 420.4.7.14., “Mass Placements.”

Leave in place weight-supporting forms and falsework spanning more than 1 ft. for all bridge components and culvert slabs except as directed otherwise until the concrete has attained a compressive strength of 2,500 psi. Remove forms for other structural components as necessary.

Remove inside forms (walls and top slabs) for box culverts and sewers after concrete has attained a compressive strength of 1,800 psi if an approved overhead support system is used to transfer the weight of the top slab to the walls of the box culvert or sewer before removal of the support provided by the forms.

Forms or parts of forms may be removed only if constructed to permit removal without disturbing forms or falsework required to be left in place for a longer period on other portions of the structure.

Remove all metal appliances used inside forms for alignment to a depth of at least 1/2 in. from the concrete surface. Make the appliances so metal may be removed without undue chipping or spalling of the concrete, and so it leaves a smooth opening in the concrete surface when removed. Do not burn off rods, bolts, or ties.

Remove all forms and falsework unless otherwise directed.

4.12. **Defective Work.** Repair defective work as soon as possible. Remove and replace at the expense of the Contractor any defect that cannot be repaired to the satisfaction of the Engineer.

4.13. **Ordinary Surface Finish.** Apply an ordinary surface finish to all concrete surfaces. Provide flat or textured surfaces as specified with uniform appearance. Address defects and surface irregularities not consistent with the intent of the expected finish by the following:
Chip away all loose or broken material to sound concrete where porous, spalled, or honeycombed areas are visible after form removal.

Repair spalls in accordance with the procedures outlined in the Concrete Repair Manual available on the Department’s website.

Clean and fill holes or spalls caused by the removal of form ties, etc., with latex grout, cement grout, or epoxy grout as approved. Fill only the holes. Do not blend the patch with the surrounding concrete. On surfaces to receive a rub finish in accordance with Item 427, "Surface Finishes for Concrete," chip out exposed parts of metals chairs to a depth of 1/2 in. and repair the surface.

Remove all fins, rust staining, runs, drips, or mortar from surfaces that will be exposed. Smooth all form marks and chamfer edges by grinding or dry-rubbing.

Ensure all repairs are dense, well-bonded, and properly cured. Finish exposed large repairs to blend with the surrounding concrete where a higher class of finish is not specified.

Apply an ordinary surface finish as the final finish to the following exposed surfaces unless noted otherwise:

- inside and top of inlets,
- inside and top of manholes,
- inside of sewer appurtenances, and
- inside of culvert barrels.

Form marks and chamfer edges do not need to be smoothed for the inside of culvert barrels.

5. MEASUREMENT

This item will be measured by the cubic yard, square yard, foot, square foot, or by each structure.

5.1. General. Concrete quantities will be based on the dimensions shown on the plans or those established in writing by the Engineer.

In determining quantities, no deductions will be made for chamfers less than 2 in. or for embedded portions of steel or prestressed concrete beams, piling, anchor bolts, reinforcing steel, drains, weep holes, junction boxes, electrical or telephone conduit, ducts and voids for prestressed tendons, or embedded portions of light fixtures.

Variation in concrete headwall quantity incurred when an alternate bid for pipe is permitted will not be cause for payment adjustment.

Quantities revised by a change in design, measured as specified, will be increased or decreased and included for payment.

5.2. Plans Quantity. Structure elements designated in Table 1 and measured by the cubic yard are plans quantity measurement items. The quantity to be paid for plans quantity items is the quantity shown in the proposal unless modified by Article 9.2., “Plans Quantity Measurement.” Additional measurements or calculations will be made if adjustments of quantities are required.

No adjustment will be made for footings or other in-ground elements where the Contractor has been allowed to place concrete in an excavation without forms.
Table 1
Plans Quantity Payment
(Cubic Yard Measurement Only)

<table>
<thead>
<tr>
<th>Culverts and culvert wing walls</th>
<th>Abutments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headwalls for pipe</td>
<td>Footings</td>
</tr>
<tr>
<td>Retaining walls</td>
<td>Pile bent caps</td>
</tr>
<tr>
<td>Inlets and manholes</td>
<td>Post-tensioned elements</td>
</tr>
</tbody>
</table>

Note—Other elements, including pier and bent concrete, may be paid for as "plans quantity" when shown on the plans.

5.3. Measured in Place. Items not paid for as "plans quantity" will be measured in place.

6. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for the class of concrete and element identified and by the special designation when appropriate. This price is full compensation for furnishing, hauling, and mixing concrete materials; furnishing, bending, fabricating, splicing, welding and placing the required reinforcement; clips, blocks, metal spacers, ties, wire, or other materials used for fastening reinforcement in place; furnishing, placing, and stressing post-tensioning system; placing, finishing, and curing concrete; mass placement controls; applying ordinary surface finish; furnishing and placing drains, metal flashing strips, and expansion-joint material; excavation, subgrade preparation; and forms and falsework, equipment, labor, tools, and incidentals.

Price will be adjusted in accordance with Article 421.6. "Measurement and Payment" when required to address non-compliance of project acceptance testing.

Design and installation of foundations for falsework is at the Contractor's expense.

In addition to the work described above, for extending structures the unit prices bid for the various classifications of concrete shown are full compensation for removing and disposing of, if necessary, the designated portion of the existing structure; removing, stockpiling if necessary, and replacing headwall units for reuse; cleaning, bending, and cutting of exposed reinforcing steel; splicing of new reinforcing steel to existing reinforcing steel; installation of dowels; and cleaning and preparing existing concrete surfaces.
Item 421

Hydraulic Cement Concrete

1. DESCRIPTION

Furnish hydraulic cement concrete for concrete pavements, concrete structures, and other concrete construction.

2. MATERIALS

Use materials from prequalified sources listed on the Department website. Provide coarse and fine aggregates from sources listed in the Department’s Concrete Rated Source Quality Catalog (CRSQC). Use materials from non-listed sources only when tested and approved by the Engineer before use. Allow 30 calendar days for the Engineer to sample, test, and report results for non-listed sources. Do not combine approved material with unapproved material.


2.2. Supplementary Cementing Materials (SCM).

- Fly Ash. Furnish fly ash, ultra-fine fly ash (UFFA), and modified Class F fly ash (MFFA) conforming to DMS-4610, “Fly Ash.”
- Slag Cement. Furnish Slag Cement conforming to DMS-4620, “Slag Cement.”
- Silica Fume. Furnish silica fume conforming to DMS-4630, “Silica Fume.”
- Metakaolin. Furnish metakaolin conforming to DMS-4635, “Metakaolin.”

2.3. Cementitious Material. Cementitious materials are the cement and supplementary cementing materials used in concrete.

2.4. Chemical Admixtures. Furnish admixtures conforming to DMS-4640, “Chemical Admixtures for Concrete.”

2.5. Water. Furnish mixing and curing water that is free from oils, acids, organic matter, or other deleterious substances. Water from municipal supplies approved by the Texas Department of Health will not require testing. Provide test reports showing compliance with Table 1 before use when using water from other sources.

Water that is a blend of concrete wash water and other acceptable water sources, certified by the concrete producer as complying with the requirements of both Table 1 and Table 2, may be used as mix water. Test the blended water weekly for 4 weeks to ensure compliance with Table 1 and Table 2 or provide previous test results. Then test every month for compliance. Provide water test results upon request.
Table 1
Chemical Limits for Mix Water

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Test Method</th>
<th>Maximum Concentration (ppm or mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloride (Cl)</td>
<td>ASTM C114</td>
<td>500</td>
</tr>
<tr>
<td>Prestressed concrete</td>
<td></td>
<td>500</td>
</tr>
<tr>
<td>Bridge decks &amp; superstructure</td>
<td></td>
<td>1,000</td>
</tr>
<tr>
<td>All other concrete</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfate (SO4)</td>
<td>ASTM C114</td>
<td>2,000</td>
</tr>
<tr>
<td>Alkalies (Na2O + 0.658K2O)</td>
<td>ASTM C114</td>
<td>600</td>
</tr>
<tr>
<td>Total solids</td>
<td>ASTM C1603</td>
<td>50,000</td>
</tr>
</tbody>
</table>

Table 2
Acceptance Criteria for Questionable Water Supplies

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive strength, min % control at 7 days</td>
<td>ASTM C31, ASTM C39;</td>
<td>90</td>
</tr>
<tr>
<td>Time of set, deviation from control, h:min.</td>
<td>ASTM C403</td>
<td>From 1:00 early to 1:30 later</td>
</tr>
</tbody>
</table>

1. Base comparisons on fixed proportions and the same volume of test water compared to the control mix using 100% potable water or distilled water.
2. Base comparisons on sets consisting of at least 2 standard specimens made from a composite sample.

Do not use mix water that has an adverse effect on the air-entraining agent, on any other chemical admixture, or on strength or time of set of the concrete. Use mixing and curing water free of iron and other impurities that may cause staining or discoloration when using white hydraulic cement.

2.6. Aggregate.

2.6.1. Coarse Aggregate. Provide coarse aggregate consisting of durable particles of gravel, crushed blast furnace slag, recycled crushed hydraulic cement concrete, crushed stone, or combinations which are free from frozen material and from injurious amounts of salt, alkali, vegetable matter, or other objectionable material, either free or as an adherent coating. Provide coarse aggregate of uniform quality throughout.

Provide coarse aggregate with the requirements listed in Table 3 unless otherwise shown on the plans.

Table 3
Coarse Aggregate Requirements

<table>
<thead>
<tr>
<th>Description</th>
<th>Test Method</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight of Clay Lumps, % Max</td>
<td>Tex-413-A</td>
<td>0.25</td>
</tr>
<tr>
<td>Weight of Shale, % Max</td>
<td>Tex-410-A</td>
<td>1.0</td>
</tr>
<tr>
<td>Weight of Laminate and Fraise Particle, % Max</td>
<td>Tex-411-A</td>
<td>5.0</td>
</tr>
<tr>
<td>L-A Abrasion Wear, % Max</td>
<td>Tex-405-A</td>
<td>40</td>
</tr>
<tr>
<td>5-Cycle Magnesium Sulfate Soundness, % Max</td>
<td>Tex-406-A</td>
<td>25</td>
</tr>
<tr>
<td>6-Cycle Magnesium Sulfate Soundness, % Max</td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>Loss by Decantation, % Max</td>
<td></td>
<td>1.5</td>
</tr>
</tbody>
</table>

1. Recycled crushed hydraulic cement concrete is not subject to 5-cycle magnesium sulfate soundness requirements.
2. Allowed when air-entrained concrete is used at the Contractor’s option.
3. Only when air-entrained concrete is required by the plans.

Increase the loss by decantation limit to 3.0% for all classes of concrete and 5.0% for Class A, B, and P if the material finer than the No. 200 sieve is determined to be at least 85% calcium carbonate in accordance with Tex-406-A, Part III, in the case of coarse aggregates made primarily from crushing stone unless otherwise shown on the plans. Provide test results upon request.

Provide coarse aggregate or combination of aggregates conforming to the gradation requirements shown in Table 4 when tested in accordance with Tex-401-A unless otherwise specified.
2.6.2. **Fine Aggregate.** Provide fine aggregate consisting of clean, hard, durable particles of natural, manufactured sand, recycled crushed hydraulic cement concrete, slag, lightweight aggregate, or a combination thereof. Provide fine aggregate free from frozen material and from injurious amounts of salt, alkali, vegetable matter, or other objectionable material.

Provide fine aggregates with the requirements in Table 5 unless otherwise shown on the plans.

<table>
<thead>
<tr>
<th>Description</th>
<th>Test Method</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight of Clay Lumps, % Max</td>
<td>Tex-413-A</td>
<td>0.50</td>
</tr>
<tr>
<td>Organic Impurities(^1)</td>
<td>Tex-408-A</td>
<td>Color not darker than standard</td>
</tr>
<tr>
<td>Sand Equivalent</td>
<td>Tex-203-F(^1)</td>
<td>80</td>
</tr>
<tr>
<td>Fineness Modulus</td>
<td>Tex-402-A(^1)</td>
<td>2.3 to 3.1</td>
</tr>
</tbody>
</table>

\(^1\) Only when air-entrained concrete is specified.

Provide fine aggregate or combinations of aggregates conforming to the gradation requirements shown in Table 6 when tested in accordance with Tex-401-A unless otherwise specified.

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot;</td>
<td>100</td>
</tr>
<tr>
<td>#4</td>
<td>95–100</td>
</tr>
<tr>
<td>#8</td>
<td>80–100</td>
</tr>
<tr>
<td>#16</td>
<td>50–85</td>
</tr>
<tr>
<td>#30</td>
<td>25–55</td>
</tr>
<tr>
<td>#50</td>
<td>10–35(^1)</td>
</tr>
<tr>
<td>#100</td>
<td>0–10</td>
</tr>
<tr>
<td>#200</td>
<td>0–3(^2)</td>
</tr>
</tbody>
</table>

\(^1\) 6–35 when sand equivalent value is greater than 85.
\(^2\) 0–6 for manufactured sand.

2.6.3. **Intermediate Aggregate.** Provide intermediate aggregate consisting of clean, hard, durable particles of natural, manufactured sand, slag, recycled crushed hydraulic cement concrete, lightweight aggregate, or a combination thereof when optimized aggregate gradation (OAG) concrete is specified or when used at the Contractor’s option. Provide intermediate aggregate free from frozen material and injurious amounts of salt, alkali, vegetable matter, or other objectionable material.

Provide intermediate aggregate with the requirements in Table 7.
Table 7
Intermediate Aggregate Requirements

<table>
<thead>
<tr>
<th>Description</th>
<th>Test Method</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight of Clay Lumps, % Max</td>
<td>Tex-413-A</td>
<td>0.50</td>
</tr>
<tr>
<td>L.A. Abrasion Wear, % Max</td>
<td>Tex-410-A</td>
<td>40</td>
</tr>
<tr>
<td>5-Cycle Magnesium Sulfate Soundness, (1,2,3) non-air-entrained concrete, % Max</td>
<td>Tex-411-A</td>
<td>25</td>
</tr>
<tr>
<td>5-Cycle Magnesium Sulfate Soundness, (1,2,4) air-entrained concrete, % Max</td>
<td>Tex-408-A</td>
<td>18</td>
</tr>
<tr>
<td>Organic Impurities(^1)</td>
<td>Tex-406-A</td>
<td>Color not darker than standard</td>
</tr>
<tr>
<td>Loss by Decantation, % Max</td>
<td>Tex-406-A</td>
<td>1.5</td>
</tr>
</tbody>
</table>

1. Only applies to the portion retained on the No. 4 sieve, if more than 30% of the intermediate aggregate is retained on the No. 4 sieve.
2. Recycled crushed hydraulic cement concrete is not subject to 5-cycle magnesium sulfate soundness requirements.
3. Allowed when air-entrained concrete is used at the Contractor's option.
4. Only when air-entrained concrete is required by the plans.
5. Only applies to the portion passing the 3/8 in. sieve, if more than 30% of the intermediate aggregate is passing the 3/8 in. sieve.

For the portion retained on the No. 4 sieve, if more than 30% of the intermediate aggregate is retained on the No. 4 sieve, and in the case of aggregates made primarily from crushing stone, unless otherwise shown on the plans, the loss by decantation may be increased to 3.0% for all classes of concrete and 5.0% for Class A, B, and P if the material finer than the No. 200 sieve is determined to be at least 85% calcium carbonate in accordance with Tex-406-A, Part III. Provide test results upon request.

2.7. Mortar and Grout. Furnish pre-packaged grouts conforming to DMS-4675, "Cementitious Grouts and Mortars for Miscellaneous Applications," when specified for applications other than post-tension grouting.

Section 421.4.2.6., "Mix Design Options," does not apply for mortar and grout.


2.8.1. Cement and Supplementary Cementing Materials. Store all cement and supplementary cementing materials in weatherproof enclosures that will protect them from dampness or absorption of moisture.

When permitted, small quantities of packaged cementitious material may be stored in the open, on a raised platform, and under waterproof covering for up to 48 hr.

2.8.2. Aggregates. Handle and store concrete aggregates in a manner that prevents contamination with foreign materials. Clear and level the sites for the stockpiles of all vegetation if the aggregates are stored on the ground and do not use the bottom 6-in. layer of aggregate without cleaning the aggregate before use.

Maintain separate stockpiles and prevent intermixing when conditions require the use of 2 or more grades of coarse aggregates. Separate the stockpiles using physical barriers where space is limited. Store aggregates from different sources in different stockpiles unless the Engineer authorizes pre-blending of the aggregates. Minimize segregation in stockpiles. Remix and test stockpiles when segregation is apparent.

Sprinkle stockpiles to control moisture and temperature as necessary. Maintain reasonably uniform moisture content in aggregate stockpiles.

2.8.3. Chemical Admixtures. Store admixtures in accordance with manufacturer's recommendations and prevent admixtures from freezing.

3. EQUIPMENT

3.1. Concrete Plants and Mixing Equipment. Except for volumetric stationary plant or truck (auger) mixers, each plant and truck mixer must be currently certified by the National Ready Mixed Concrete Association (NRMCA) or have an inspection report signed and sealed by a licensed professional engineer showing concrete measuring, mixing, and delivery equipment meets all requirements of ASTM C94. A new
certification or signed and sealed report is required every time a plant is moved. Plants with a licensed professional engineer’s inspection require re-inspection every 2 yr. Provide a copy of the certification or the signed and sealed inspection report to the Engineer. Remove equipment or facilities from service until corrected when they fail to meet specification requirements.

When allowed on the plans or by the Engineer, for concrete classes not identified as structural concrete in Table 8 or for Class C concrete not used for bridge-class structures, the Engineer may inspect and approve all plants and trucks instead of the NRMCA or non-Department engineer-sealed certifications. The criteria and frequency of Engineer approval of plants and trucks is the same used for NRMCA certification.

Inspect and furnish inspection reports on the condition of blades and fins and their percent wear from the original manufacturer’s design for truck mixers and agitators annually. Repair mixing equipment exhibiting 10% or more wear before use. If an inspection within 12 mo. is not practical, a 2-mo. grace period (for a maximum of 14 mo. between inspections) is permitted.

3.1.1. **Scales.** Check all scales before beginning of operations, after each move, or whenever their accuracy or adequacy is questioned, and at least once every 6 mo. Immediately correct deficiencies, and recalibrate. Provide a record of calibration showing scales in compliance with ASTM C94 requirements. Check batching accuracy of volumetric water batching devices at least every 90 days. Check batching accuracy of chemical admixture dispensing devices at least every 6 mo. Perform daily checks as necessary to ensure measuring accuracy.

3.1.2. **Volumetric Mixers.** Provide volumetric mixers with rating plates defining the capacity and the performance of the mixer in accordance with the Volumetric Mixer Manufacturers Bureau or equivalent. Provide volumetric mixers that comply with ASTM C685. Provide test data showing mixers meet the uniformity test requirements of Tex-472-A.

Unless allowed on the plans or by the Engineer, volumetric truck (auger) mixers may not supply classes of concrete identified as structural concrete in Table 8.

3.1.3. **Agitators and Truck and Stationary Mixers.** Provide stationary and truck mixers capable of combining the ingredients of the concrete into a thoroughly mixed and uniform mass and capable of discharging the concrete so at least 5 of the 6 requirements of Tex-472-A are met.

Perform concrete uniformity tests on mixers or agitators in accordance with Tex-472-A as directed, to resolve issues of mix uniformity and mixer performance.

Perform the mixer or agitator uniformity test at the full rated capacity of the equipment. Remove all equipment that fails the uniformity test from service.

Inspect and maintain mixers and agitators. Keep them free of concrete buildup, and repair or replace worn or damaged blades or fins.

Ensure all mixers have a plate affixed showing manufacturer’s recommended operating speed and rated capacity for mixing and agitating.

3.2. **Hauling Equipment.** Provide hauling equipment capable of maintaining the mixed concrete in a thoroughly mixed and uniform mass, and discharging the concrete with a satisfactory degree of uniformity.

Provide equipment with smooth, mortar-tight metal containers equipped with gates that prevent accidental discharge of the concrete when using non-agitating equipment for transporting concrete.

Maintain hauling equipment clean and free of built-up concrete.

3.3. **Testing Equipment.** Furnish and maintain the following in accordance with the pertinent test procedure unless otherwise shown on the plans or specified:
■ sieves necessary to perform aggregate gradation analysis when optimized aggregate gradation is specified,
■ equipment necessary to perform Tex-415-A and Tex-422-A,
■ equipment necessary to perform Tex-409-A or Tex-425-A,
■ test molds,
■ curing facilities,
■ maturity meters if used, and
■ wheelbarrow or other container acceptable for the sampling of the concrete.

Provide strength-testing equipment when required in accordance with the Contract-controlling test unless shown otherwise.

4. CONSTRUCTION

4.1. Classification of Concrete Mix Designs. Provide classes of concrete meeting the requirements shown in Table 8.

A higher-strength class of concrete with equal or lower water-to-cementitious material (w/cm) ratio may be substituted for the specified class of concrete when approved.

4.2. Mix Design Proportioning. Furnish mix designs using ACI 211, Tex-470-A, or other approved procedures for the classes of concrete listed in Table 8 unless a design method is indicated on the plans. Perform mix design proportioning by absolute volume method unless otherwise approved. Perform cement replacement using equivalent weight method unless otherwise approved.

Do not exceed the maximum w/cm ratio listed in Table 8 when designing the mixture.

4.2.1. Cementitious Materials. Do not exceed 700 lb. of cementitious material per cubic yard of concrete unless otherwise specified or approved.
■ Use cement of the same type and from the same source for monolithic placements.
■ Do not use supplementary cementing materials when white hydraulic cement is specified.

<table>
<thead>
<tr>
<th>Class of Concrete</th>
<th>Design Strength, $^1$ Min Fr. (psi)</th>
<th>Max w/cm Ratio</th>
<th>Coarse Aggregate Grades$^{1,3,4}$</th>
<th>Cement Types</th>
<th>Mix Design Options</th>
<th>Exceptions to Mix Design Options</th>
<th>General Usage$^6$</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3,000</td>
<td>0.60</td>
<td>1–4, 8</td>
<td>I, II, III,</td>
<td>1, 2, 4, 6, 7</td>
<td>When the cementitious material content does not exceed 520 lb./cu. yd., Class C fly ash may be used instead of Class F fly ash.</td>
<td>Curb, gutter, curb &amp; gutter, conc. retards, sidewalks, driveways, back-up walls, anchors, non-reinforced drilled shafts</td>
</tr>
<tr>
<td>B</td>
<td>2,000</td>
<td>0.60</td>
<td>2–7</td>
<td>E, IP, IS, IT,$^7$ V</td>
<td></td>
<td></td>
<td>Ricrap, traffic signal controller foundations, small roadside signs, and anchors</td>
</tr>
<tr>
<td>C$^6$</td>
<td>3,600</td>
<td>0.45</td>
<td>1–6</td>
<td>I, II, III, IP, IS, IT,$^7$ V</td>
<td>1–8</td>
<td></td>
<td>Drilled shafts, bridge substructure, bridge raling, culverts except top slab of direct traffic culverts, headwalls, wing walls, inlets, manholes, concrete traffic barrier (cast-in-place)</td>
</tr>
<tr>
<td>E</td>
<td>3,000</td>
<td>0.50</td>
<td>2–5</td>
<td>I, II, III, IP, IS, IT,$^7$ V</td>
<td>1–8</td>
<td>When the cementitious material content does not exceed 520 lb./cu. yd., Class C fly ash may be used instead of Class F fly ash.</td>
<td>Seal concrete</td>
</tr>
<tr>
<td>Class of Concrete</td>
<td>Design Strength, t psi</td>
<td>Max w/cm Ratio</td>
<td>Coarse Aggregate Grades</td>
<td>Cement Types</td>
<td>Mix Design Options</td>
<td>Exceptions to Mix Design Options</td>
<td>General Usage</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------------------</td>
<td>----------------</td>
<td>------------------------</td>
<td>--------------</td>
<td>-------------------</td>
<td>---------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>F&lt;sup&gt;6&lt;/sup&gt;</td>
<td>Note&lt;sup&gt;6&lt;/sup&gt;</td>
<td>0.45</td>
<td>2–5</td>
<td>I, II, III, IP, IS, IT, IT&lt;sup&gt;7&lt;/sup&gt;, IT&lt;sup&gt;7&lt;/sup&gt;, IT&lt;sup&gt;7&lt;/sup&gt;, V</td>
<td>1–5</td>
<td>Do not use Type III cement in mass placement concrete. Up to 20% of blended cement may be replaced with listed SCMs when Option 4 is used for precast concrete.</td>
<td>Railroad structures; occasionally for bridge piers, columns, or bents</td>
</tr>
<tr>
<td>H&lt;sup&gt;4&lt;/sup&gt;</td>
<td>Note&lt;sup&gt;6&lt;/sup&gt;</td>
<td>0.45</td>
<td>3–6</td>
<td>I, II, III, IP, IS, IT, IT&lt;sup&gt;7&lt;/sup&gt;, IT&lt;sup&gt;7&lt;/sup&gt;, V</td>
<td>1–5</td>
<td>Do not use Type III cement in mass placement concrete. Up to 20% of blended cement may be replaced with listed SCMs when Option 4 is used for precast concrete.</td>
<td>Precast concrete, post-tension members</td>
</tr>
<tr>
<td>S&lt;sup&gt;5&lt;/sup&gt;</td>
<td>4,000</td>
<td>0.45</td>
<td>2–5</td>
<td>I, II, III, IP, IS, IT, IT&lt;sup&gt;7&lt;/sup&gt;, IT&lt;sup&gt;7&lt;/sup&gt;, V</td>
<td>1–8</td>
<td>Bridge slabs, top slabs of direct traffic culverts, approach slabs</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>See item 360, &quot;Concrete Pavement.&quot;</td>
<td>0.50</td>
<td>2–3</td>
<td>I, II, III, IP, IS, IT, IT, IT&lt;sup&gt;7&lt;/sup&gt;, IT&lt;sup&gt;7&lt;/sup&gt;, V</td>
<td>1–5</td>
<td>When the cementitious material content does not exceed 520 lb./cu. yd., Class C fly ash may be used instead of Class F fly ash.</td>
<td>Concrete pavement</td>
</tr>
<tr>
<td>CO&lt;sup&gt;6&lt;/sup&gt;</td>
<td>4,600</td>
<td>0.40</td>
<td>6</td>
<td>I, II, III, IP, IS, IT, IT&lt;sup&gt;7&lt;/sup&gt;, IT&lt;sup&gt;7&lt;/sup&gt;, V</td>
<td>1–8</td>
<td>Bridge deck concrete overlay</td>
<td></td>
</tr>
<tr>
<td>LMC&lt;sup&gt;6&lt;/sup&gt;</td>
<td>4,000</td>
<td>0.40</td>
<td>6–8</td>
<td>I, II, III, IP, IS, IT, IT&lt;sup&gt;7&lt;/sup&gt;, IT&lt;sup&gt;7&lt;/sup&gt;, V</td>
<td>1–8</td>
<td>Latex-modified concrete overlay</td>
<td></td>
</tr>
<tr>
<td>SS&lt;sup&gt;6&lt;/sup&gt;</td>
<td>3,600</td>
<td>0.45</td>
<td>4–6</td>
<td>I, II, III, IP, IS, IT, IT&lt;sup&gt;7&lt;/sup&gt;, IT&lt;sup&gt;7&lt;/sup&gt;, V</td>
<td>1–8</td>
<td>Use a minimum cementitious material content of 658 lb./cu. yd. of concrete.</td>
<td>Slurry displacement shafts, underwater drilled shafts</td>
</tr>
<tr>
<td>K&lt;sup&gt;6&lt;/sup&gt;</td>
<td>Note&lt;sup&gt;6&lt;/sup&gt;</td>
<td>0.40</td>
<td>Note&lt;sup&gt;6&lt;/sup&gt;</td>
<td>I, II, III, IP, IS, IT, IT&lt;sup&gt;7&lt;/sup&gt;, IT&lt;sup&gt;7&lt;/sup&gt;, V</td>
<td>1–8</td>
<td>Mix design options do not apply. 700 lb. of cementitious material per cubic yard limit does not apply.</td>
<td>Note&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>HES</td>
<td>Note&lt;sup&gt;6&lt;/sup&gt;</td>
<td>0.45</td>
<td>Note&lt;sup&gt;6&lt;/sup&gt;</td>
<td>I, II, III, IP, IS, IT, IT&lt;sup&gt;7&lt;/sup&gt;, IT&lt;sup&gt;7&lt;/sup&gt;, V</td>
<td>1–8</td>
<td>Concrete pavement, concrete pavement repair</td>
<td></td>
</tr>
<tr>
<td>&quot;X&quot; (HPC)</td>
<td>Note&lt;sup&gt;11&lt;/sup&gt;</td>
<td>0.45</td>
<td>Note&lt;sup&gt;11&lt;/sup&gt;</td>
<td>I, II, III, IP, IS, IT, IT&lt;sup&gt;7&lt;/sup&gt;, IT&lt;sup&gt;7&lt;/sup&gt;, V</td>
<td>1–5, 8&lt;br&gt;1–5, 8</td>
<td>Maximum fly ash replacement for Options 1 and 3 may be increased to 45%. Up to 20% of a blended cement may be replaced with listed SCMs for Option 4. Do not use Option 8 for precast concrete.</td>
<td></td>
</tr>
<tr>
<td>&quot;X&quot; (SRC)</td>
<td>Note&lt;sup&gt;11&lt;/sup&gt;</td>
<td>0.45</td>
<td>Note&lt;sup&gt;11&lt;/sup&gt;</td>
<td>I, II, III, IP, IS, IT, IT&lt;sup&gt;7&lt;/sup&gt;, IT&lt;sup&gt;7&lt;/sup&gt;, V</td>
<td>1–4, 7&lt;br&gt;1–4, 7</td>
<td>Do not use Class C Fly Ash Type III-MS may be used where allowed. Type I and Type III cements may be used with Options 1–3, with a maximum w/cm of 0.40. Up to 20% of blended cement may be replaced with listed SCMs when Option 4 is used for precast concrete. Do not use Option 7 for precast concrete.</td>
<td></td>
</tr>
</tbody>
</table>

1. Design strength must be attained within 56 days.
2. Do not use Grade 1 coarse aggregate except in massive foundations with 4 in. minimum clear spacing between reinforcing steel bars, unless otherwise permitted. Do not use Grade 1 aggregate in drilled shafts.
3. Use Grade 8 aggregates in extruded curbs unless otherwise approved.
4. Other grades of coarse aggregate maybe used in non-structural concrete classes when allowed by the Engineer.
5. For information only.
7. Do not use Type IT cements containing > 5% limestone.
8. As shown on the plans or specified.
9. "X" denotes class of concrete shown on the plans or specified.
11. Same as class of concrete shown on the plans.
4.2.2. **Aggregates.** Recycled crushed hydraulic cement concrete may be used as a coarse or fine aggregate in Class A, B, E, and P concrete. Limit recycled crushed concrete fine aggregate to a maximum of 20% of the fine aggregate.

Use light-colored aggregates when white hydraulic cement is specified.

Use fine aggregate with an acid insoluble residue of at least 60% by weight when tested in accordance with Tex-612-J in all concrete subject to direct traffic.

Use the following equation to determine if the aggregate combination meets the acid insoluble residue requirement when blending fine aggregate or using an intermediate aggregate:

\[
\frac{(A_1 \times P_1) + (A_2 \times P_2) + (A_u \times P_u)}{100} \geq 60\%
\]

where:
- \(A_1\) = acid insoluble (%) of fine aggregate 1
- \(A_2\) = acid insoluble (%) of fine aggregate 2
- \(A_u\) = acid insoluble (%) of intermediate aggregate passing the 3/8 in. sieve
- \(P_1\) = percent by weight of fine aggregate 1 of the fine aggregate blend
- \(P_2\) = percent by weight of fine aggregate 2 of the fine aggregate blend
- \(P_u\) = percent by weight of intermediate aggregate passing the 3/8 in. sieve

Alternatively to the above equation, blend fine aggregate with a micro-deval loss of less than 12%, when tested in accordance with Tex-461-A, with at least 40% of a fine aggregate with an acid insoluble residue of at least 60%.

4.2.3. **Chemical Admixtures.** Do not use Type C, Type E, Type F, or Type G admixtures in Class S bridge deck concrete. Do not use chemical admixtures containing calcium chloride in any concrete.

Use a 30% calcium nitrite solution when a corrosion-inhibiting admixture is required. The corrosion-inhibiting admixture must be set neutral unless otherwise approved. Dose the admixture at the rate of gallons of admixture per cubic yard of concrete shown on the plans.

4.2.4. **Air Entrainment.** Use an approved air-entraining admixture when air-entrained concrete is specified, or when an air-entraining admixture is used at the Contractor's option, and do not exceed the manufacturer's recommended dosage. Ensure the minimum entrained air content is at least 3.0% for all classes of concrete except Class P when air-entrained concrete is specified, during trial batch, or when providing previous field data.

4.2.5. **Slump.** Provide concrete with a slump in accordance with Table 9 unless otherwise specified. When approved, the slump of a given concrete mix may be increased above the values shown in Table 9 using chemical admixtures, provided the admixture-treated concrete has the same or lower water-to-cementitious material ratio and does not exhibit segregation or excessive bleeding. Request approval to exceed the slump limits in Table 9 sufficiently in advance for proper evaluation by the Engineer.

Perform job-control testing of slump in accordance with Section 421.4.8.3.1., "Job-Control Testing."
Table 9
Placement Slump Requirements

<table>
<thead>
<tr>
<th>General Usage1</th>
<th>Placement Slump Range,2 in.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls (over 9 in. thick), caps, columns, piers, approach slabs, concrete overlays</td>
<td>3 to 5</td>
</tr>
<tr>
<td>Bridge slabs, top slabs of direct traffic culverts, latex-modified concrete for bridge deck overlays</td>
<td>3 to 5-1/2</td>
</tr>
<tr>
<td>Inlets, manholes, walls (less than 9 in. thick), bridge railing, culverts, concrete traffic barrier, concrete pavement (formed), seal concrete</td>
<td>4 to 5-1/2</td>
</tr>
<tr>
<td>Precast concrete</td>
<td>4 to 9</td>
</tr>
<tr>
<td>Underwater concrete placements</td>
<td>6 to 8-1/2</td>
</tr>
</tbody>
</table>
| Drilled shafts, slurry displaced and underwater drilled shafts | See Item 416, "Drilled Shaft Foundations."
| Curb, gutter, curb and gutter, concrete retards, sidewalk, driveways, anchors, riprap, small roadside sign foundations, concrete pavement repair, concrete repair | As approved |

1. For information only.
2. For fiber reinforced concrete, perform slump before addition of fibers.

4.2.6. Mix Design Options.

4.2.6.1. Option 1. Replace 20% to 35% of the cement with Class F fly ash.

4.2.6.2. Option 2. Replace 35% to 50% of the cement with slag cement or MFFA.

4.2.6.3. Option 3. Replace 35% to 50% of the cement with a combination of Class F fly ash, slag cement, MFFA, UFFA, metakaolin, or silica fume; however, no more than 35% may be fly ash, and no more than 10% may be silica fume.

4.2.6.4. Option 4. Use Type IP, Type IS, or Type IT cement as allowed in Table 5 for each class of concrete. Up to 10% of a Type IP, Type IS, or Type IT cement may be replaced with Class F fly ash, slag cement, or silica fume. Use no more than 10% silica fume in the final cementitious material mixture if the Type IT cement contains silica fume, and silica fume is used to replace the cement.

4.2.6.5. Option 5. Replace 35% to 50% of the cement with a combination of Class C fly ash and at least 6% of silica fume, UFFA, or metakaolin. However, no more than 35% may be Class C fly ash, and no more than 10% may be silica fume.

4.2.6.6. Option 6. Use a lithium nitrate admixture at a minimum dosage determined by testing conducted in accordance with Tex-471-A, "Lithium Dosage Determination Using Accelerated Mortar Bar Testing." Before use of the mix, provide an annual certified test report signed and sealed by a licensed professional engineer, from a laboratory on the Department's MPL, certified by the Construction Division as being capable of testing according to Tex-471-A, "Lithium Dosage Determination Using Accelerated Mortar Bar Testing."

4.2.6.7. Option 7. Ensure the total alkali contribution from the cement in the concrete does not exceed 3.5 lb. per cubic yard of concrete when using hydraulic cement not containing SCMs calculated as follows:

\[
\text{lb. alkali per cu. yd.} = \frac{\left(\text{lb. cement per cu. yd.}\right) \times \left(\% \text{ Na}_2\text{O equivalent in cement}\right)}{100}
\]

In the above calculation, use the maximum cement alkali content reported on the cement mill certificate.

4.2.6.8. Option 8. Perform annual testing as required for any deviations from Options 1–5 or use mix design options listed in Table 10. Laboratories performing ASTM C1260, ASTM C1567, and ASTM C1293 testing must be listed on the Department's MPL. Before use of the mix, provide a certified test report signed and sealed by a licensed professional engineer demonstrating the proposed mixture conforms to the requirements of Table 10.
Provide a certified test report signed and sealed by a licensed professional engineer, when HPC is required, and less than 20% of the cement is replaced with SCMs, demonstrating ASTM C1202 test results indicate the permeability of the concrete is less than 1,500 coulombs tested immediately after either of the following curing schedules:

- Moisture cure specimens 56 days at 73°F.
- Moisture cure specimens 7 days at 73°F followed by 21 days at 100°F.

### Table 10
Option 8 Testing and Mix Design Requirements

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Mix Design Fine Aggregate</th>
<th>Mix Design Coarse Aggregate</th>
<th>Testing Requirements for Mix Design Materials or Prescriptive Mix Design Options¹</th>
</tr>
</thead>
</table>
| A        | > 0.10%                    | > 0.10%                     | Determine the dosage of SCMs needed to limit the 14-day expansion of each aggregate to 0.08% when tested individually in accordance with ASTM C1567; or Use a minimum of 40% Class C fly ash with a maximum CaO² content of 25%.
| B        | ≤ 0.10%                    | ≤ 0.10%                     | Use a minimum of 40% Class C fly ash with a maximum CaO² content of 25%; or Use any ternary combination which replaces 35% to 50% of cement.
| C        | ≤ 0.10%                    | > 0.10%                     | Use a minimum of 20% of any Class C fly ash; or Use any ternary combination which replaces 35% to 50% of cement.
| D        | > 0.10%                    | ≤ 0.10%                     | Determine the dosage of SCMs needed to limit the 14-day expansion of coarse and intermediate aggregate to 0.08% when tested individually in accordance with ASTM C1567; or Use a minimum of 40% Class C fly ash with a maximum CaO² content of 25%.
|          | > 0.10%                    | ASTC 1293 1 yr. Expansion ≤ 0.04% | Determine the dosage of SCMs needed to limit the 14-day expansion of fine aggregate to 0.08% when tested in accordance with ASTM C1567.

¹. Do not use Class C fly ash if the ASTM C1260 value of the fine, intermediate, or coarse aggregate is 0.30% or greater, unless the fly ash is used as part of a ternary system.
2. Intermediate size aggregates will fall under the requirements of mix design coarse aggregate.
3. Average the CaO content from the previous ten values as listed on the mill certificate.

### 4.2.7. Optimized Aggregate Gradation (OAG) Concrete
The gradation requirements in Table 3 and Table 4 do not apply when OAG concrete is specified or used by the Contractor unless otherwise shown on the plans. Use Tex-470-A to establish the optimized aggregate gradation. Use at least 420 lb. per cubic yard of cementitious material when OAG concrete is used unless otherwise approved. Use a coarse aggregate with a maximum nominal size of 1-1/2 in. for Class P concrete. Use a coarse aggregate for all other classes of concrete with a maximum nominal size not larger than:

- 1/5 the narrowest dimension between sides of forms, or
- 1/3 the depth of slabs, or
- 3/4 the minimum clear spacing between individual reinforcing bars or wires, bundles of bars, individual tendons, bundled tendons, or ducts.

Make necessary adjustments to individual aggregate stockpile proportions during OAG concrete production when the gradation deviates from the optimized gradation requirements.

### 4.2.8. Self-Consolidating Concrete (SCC)
Provide SCC meeting the following requirements shown in Table 11 when approved for use in precast concrete. Use concrete with a slump flow that can be placed without vibration and will not segregate or excessively bleed.

Request approval to exceed the slump flow limits sufficiently in advance for proper evaluation by the Engineer.
Table 11

Mix Design Requirements for SCC

<table>
<thead>
<tr>
<th>Tests</th>
<th>Test Method</th>
<th>Acceptable Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slump Flow for Precast Concrete</td>
<td>ASTM C1611</td>
<td>22 to 27°F</td>
</tr>
<tr>
<td>T50, sec</td>
<td>ASTM C1611</td>
<td>2 to 7</td>
</tr>
<tr>
<td>VSI Rating</td>
<td>ASTM C1611</td>
<td>0 or 1</td>
</tr>
<tr>
<td>Passing Ability, in.</td>
<td>ASTM C1621</td>
<td>≤ 2</td>
</tr>
<tr>
<td>Segregation Column, %</td>
<td>ASTM C1610</td>
<td>≤ 10</td>
</tr>
<tr>
<td>Bleeding, %</td>
<td>ASTM C232</td>
<td>≤ 2.5</td>
</tr>
</tbody>
</table>

1. These slump flow limits are generally acceptable for most applications. However, slump flow limits may be adjusted during mix design approval process and when approved by the Engineer.

4.3. Concrete Trial Batches. Perform preliminary and final trial batches when required by the plans, or when previous satisfactory field data is not available. Submit previous satisfactory field data to the Engineer showing the proposed mix design conforms to specification requirements when trial batches are not required and before concrete is placed.

Perform preliminary and final trial batches for all self-consolidating concrete mix designs.

4.3.1. Preliminary Trial Batches. Perform all necessary preliminary trial batch testing when required, and provide documentation including mix design, material proportions, and test results substantiating the mix design conforms to specification requirements.

4.3.2. Final Trial batches. Make all final trial batches using the proposed ingredients in a mixer that is representative of the mixers to be used on the job when required. Make the batch size at least 50% of the mixer's rated capacity. Perform fresh concrete tests for air content and slump, and make, cure, and test strength specimens for compliance with specification requirements. Test at least one set of design strength specimens, consisting of 2 specimens per set, at 7-day, 28-day, and at least one additional age unless otherwise directed. Before placing, provide the Engineer the option of witnessing final trial batches, including the testing of the concrete. If not provided this option, the Engineer may require additional trial batches, including testing, before the concrete is placed.

Conduct all testing listed in Table 11 when performing trial batches for self-consolidating concrete. Make an additional mixture with 3% more water than the preliminary trial batch. Make necessary adjustments to the mix design if this additional mixture does not meet requirements of Table 11. Cast and evaluate mock-ups for precast concrete that are representative of the actual product as directed. Provide the Engineer the option of witnessing final trial batches, including the testing of the concrete and the casting of the mock-ups before placement. If not provided this option, the Engineer may require additional trial batches, including testing and mock-ups, before the concrete is placed.

Establish 7-day compressive strength target values using the following formula for each Class A, B, and E concrete mix designs to be used:

\[
\text{Target value} = \text{Minimum design strength} \times \frac{7\text{-day avg. trial batch strength}}{28\text{-day avg. trial batch strength}}
\]

Submit previous satisfactory field data, data from a new trial batch, or other evidence showing the change will not adversely affect the relevant properties of the concrete when changes are made to the type, brand, or source of aggregates, cement, SCM, water, or chemical admixtures. Submit the data for approval before making changes to the mix design. A change in vendor does not necessarily constitute a change in materials or source. The Engineer may waive new trial batches when there is a prior record of satisfactory performance with the ingredients. During concrete production, dosage changes of chemical admixtures used in the trial batches will not require a re-evaluation of the mix design.
The Contractor has the option of performing trial batches in conjunction with concrete placements except for SCC mixtures, when new trial batches are required during the course of the project. If the concrete fails to meet any requirement, the Engineer will determine acceptability and payment adjustments.

Establish the strength—maturity relationship in accordance with Tex-426-A when the maturity method is specified or permitted. When using the maturity method, any changes in any of the ingredients, including changes in proportions, will require the development of a new strength—maturity relationship for the mix.

4.3.3. **Mix Design of Record.** Once a trial batch or previously satisfactory field data substantiates the mix design, the proportions and mixing methods used become the mix design of record. Do not exceed mix design water-to-cementitious material ratio.

4.4. **Production Testing.**

4.4.1. **Aggregate Moisture Testing.** Determine moisture content per Tex-409-A or Tex-425-A for coarse, intermediate, and fine aggregates at least twice a week, when there is an apparent change, or for new shipments of aggregate. When aggregate hoppers or storage bins are equipped with properly maintained electronic moisture probes for continuous moisture determination, moisture tests per Tex-409-A or Tex-425-A are not required. Electronic moisture probes, however, must be verified at least every 90 days against Tex-409-A and be accurate to within 1.0% of the actual moisture content.

When producing SCC, and when aggregate hoppers or storage bins are not equipped with electric moisture probes, determine the moisture content of the aggregates before producing the first concrete batch each day. Thereafter, determine the moisture content every 4 hr. or when there is an apparent change while SCC is being produced.

4.4.2. **Aggregate Gradation Testing.** Perform a sieve analysis in accordance with Tex-401-A on each stockpile used in the blend at least one day before producing OAG concrete when producing optimized aggregate gradation concrete. Perform sieve analysis on each stockpile after every 10,000 cubic yards of OAG concrete produced. Provide sieve analysis data to the Engineer.

4.5. **Measurement of Materials.**

4.5.1. **Non-Volumetric Mixers.** Measure aggregates by weight. Correct batch weight measurements for aggregate moisture content. Measure mixing water, consisting of water added to the batch, ice added to the batch, water occurring as surface moisture on the aggregates, and water introduced in the form of admixtures, by volume or weight. Measure ice by weight. Measure cement and supplementary cementing materials in a hopper and on a separate scale from those used for other materials. Measure the cement first when measuring the cumulative weight. Measure concrete chemical admixtures by weight or volume. Measure batch materials within the tolerances of Table 12.

<table>
<thead>
<tr>
<th>Material</th>
<th>Tolerance (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement, wt.</td>
<td>-1 to +3</td>
</tr>
<tr>
<td>SCM, wt.</td>
<td>-1 to +3</td>
</tr>
<tr>
<td>Cement + SCM (cumulative weighing), wt.</td>
<td>-1 to +3</td>
</tr>
<tr>
<td>Water, wt. or volume</td>
<td>±3¹</td>
</tr>
<tr>
<td>Fine aggregate, wt.</td>
<td>±2</td>
</tr>
<tr>
<td>Coarse aggregate, wt.</td>
<td>±2</td>
</tr>
<tr>
<td>Fine + coarse aggregate (cumulative weighing), wt.</td>
<td>±1</td>
</tr>
<tr>
<td>Chemical admixtures, wt. or volume</td>
<td>±3</td>
</tr>
</tbody>
</table>

1. Allowable deviation from target weight not including water withheld or moisture in the aggregate. The Engineer will verify the water-to-cementitious material ratio is within specified limits.

Ensure the quantity measured, when measuring cementitious materials at less than 30% of scale capacity, is accurate to not less than the required amount and not more than 4% in excess. Ensure the cumulative quantity, when measuring aggregates in a cumulative weigh batcher at less than 30% of the scale capacity,
is measured accurate to ±0.3% of scale capacity or ±3% of the required cumulative weight, whichever is less.

Measure cement in number of bags under special circumstances when approved. Use the weights listed on the packaging. Weighing bags of cement is not required. Ensure fractional bags are not used except for small hand-mixed batches of approximately 5 cu. ft. or less and when an approved method of volumetric or weight measurement is used.

4.5.2. **Volumetric Mixers.** Provide an accurate method of measuring all ingredients by volume, and calibrate equipment to assure correct measurement of materials within the specified tolerances. Base tolerances on volume-weight relationship established by calibration, and measure the various ingredients within the tolerances of Table 13. Correct batch measurements for aggregate moisture content.

<table>
<thead>
<tr>
<th>Material</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement, wt. %</td>
<td>0 to +4</td>
</tr>
<tr>
<td>SCM, wt. %</td>
<td>0 to +4</td>
</tr>
<tr>
<td>Fine aggregate, wt. %</td>
<td>±2</td>
</tr>
<tr>
<td>Coarse aggregate, wt. %</td>
<td>±2</td>
</tr>
<tr>
<td>Admixtures, wt. or volume %</td>
<td>±3</td>
</tr>
<tr>
<td>Water, wt. or volume %</td>
<td>±1</td>
</tr>
</tbody>
</table>

4.6. **Mixing and Delivering Concrete.**

4.6.1. **Mixing Concrete.** Operate mixers and agitators within the limits of the rated capacity and speed of rotation for mixing and agitation as designated by the manufacturer of the equipment. Provide concrete in a thoroughly mixed and uniform mass with a satisfactory degree of uniformity when tested in accordance with Tex-472-A.

Do not top-load new concrete onto returned concrete.

Adjust mixing times and batching operations as necessary when the concrete contains silica fume to ensure the material is completely and uniformly dispersed in the mix. The dispersion of the silica fume within the mix will be verified by the Construction Division, Materials and Pavements Section, using cylinders made from trial batches. Make necessary changes to the batching operations, if uniform dispersion is not achieved, until uniform and complete dispersion of the silica fume is achieved.

Mix concrete by hand methods or in a small motor-driven mixer when permitted, for small placements of less than 2 cu. yd. For such placements, proportion the mix by volume or weight.

4.6.2. **Delivering Concrete.** Deliver concrete to the project in a thoroughly mixed and uniform mass, and discharge the concrete with a satisfactory degree of uniformity. Conduct testing in accordance with Tex-472-A when there is a reason to suspect the uniformity of concrete and as directed.

Maintain concrete delivery and placement rates sufficient to prevent cold joints.

Adding chemical admixtures or the portion of water withheld is only permitted at the jobsite, under the supervision of the Engineer, to adjust the slump or slump flow of the concrete. Do not add water or chemical admixtures to the batch after more than an amount needed to conduct slump testing has been discharged. Turn the drum or blades at least 30 additional revolutions at mixing speed to ensure thorough and uniform mixing of the concrete. When this water is added, do not exceed the approved mix design water-to-cementitious material ratio.

Before unloading, furnish the delivery ticket for the batch of concrete containing the information required on Department Form 596, "Concrete Batch Ticket." The Engineer will verify all required information is provided on the delivery tickets. The Engineer may suspend concrete operations until the corrective actions are
implemented if delivery tickets do not provide the required information. The Engineer will verify the design water-to-cementitious material ratio is not exceeded.

Begin the discharge of concrete delivered in truck mixers within the times listed in Table 14. Concrete may be discharged after these times provided the concrete temperature and slump meet the requirements listed in this Item and other pertinent Items. Perform these tests with certified testing personnel per Section 421.4.8.1, “Certification of Testing Personnel.” Provide the Engineer the option of witnessing testing of the concrete. If not provided this option, the Engineer may require additional testing before the concrete is placed.

<table>
<thead>
<tr>
<th>Fresh Concrete Temperature, °F</th>
<th>Max Time After Batching for Concrete Not Containing Type B or D Admixtures, min.</th>
<th>Max Time After Batching for Concrete Containing Type B or D Admixtures, min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 and above</td>
<td>45</td>
<td>75</td>
</tr>
<tr>
<td>75 ≤ T &lt; 90</td>
<td>60</td>
<td>90</td>
</tr>
<tr>
<td>T &lt; 75</td>
<td>90</td>
<td>120</td>
</tr>
</tbody>
</table>

1. Concrete must contain at least the minimum manufacturer’s recommended dosage of Type B or D admixture.

4.7. Placing, Finishing, and Curing Concrete. Place, finish, and cure concrete in accordance with the pertinent Items.

4.8. Sampling and Testing of Concrete. Unless otherwise specified, all fresh and hardened concrete is subject to testing as follows:

4.8.1. Certification of Testing Personnel. Contractor personnel performing testing must be either ACI-certified or qualified by a Department-recognized equivalent written and performance testing program for the tests being performed. Personnel performing these tests are subject to Department approval. Use of a commercial laboratory is permitted at the Contractor’s option. All personnel performing testing using the maturity method must be qualified by a training program recognized by the Department before using this method on the job.

4.8.2. Fresh Concrete. Provide safe access and assistance to the Engineer during sampling. Fresh concrete will be sampled for testing at the discharge end if using belt conveyors or pumps. When it is impractical to sample at the discharge end, a sample will be taken at the time of discharge from the delivery equipment and correlation testing will be performed and documented to ensure specification requirements are met at the discharge end.

4.8.3. Testing of Fresh Concrete. Test for the fresh properties listed in Table 15.

<table>
<thead>
<tr>
<th>Tests</th>
<th>Test Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slump1</td>
<td>Tex-415-A</td>
</tr>
<tr>
<td>Temperature1</td>
<td>Tex-422-A</td>
</tr>
<tr>
<td>Air Content1,2</td>
<td>Tex-414-A, Tex-416-A or ASTM C457</td>
</tr>
</tbody>
</table>

1. Job-control testing performed by the Contractor.
2. Only required when air-entrained concrete is specified on the plans.

Concrete with a slump lower than the minimum placement slump in Table 9 after the addition of all water withheld, or concrete exhibiting segregation and excessive bleeding will be rejected.

4.8.3.1. Job-Control Testing. Perform job-control testing as specified in Table 16 unless otherwise specified. Provide the Engineer the opportunity to witness the testing. The Engineer may require a retest if not given the opportunity to witness. Immediately notify the Engineer of any nonconformity issues. Furnish a copy of all test results to the Engineer daily.
### Table 16
Job-Control Testing Frequencies

<table>
<thead>
<tr>
<th>Concrete Placements</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridge Deck Placements</td>
<td>Test the first few loads, then every 60 cu. yd. or fraction thereof.</td>
</tr>
<tr>
<td>All Other Structural Class Concrete Placements</td>
<td>One test every 60 cu. yd. or fraction thereof per class per day.</td>
</tr>
<tr>
<td>Non-Structural Class Concrete Placements</td>
<td>One test every 150 cu. yd. or fraction thereof.</td>
</tr>
</tbody>
</table>

Immediately resample and retest the concrete slump when the concrete exceeds the slump range at time of placement. If the concrete exceeds the slump range after the retest, and is used at the Contractor’s option, the Engineer will make strength specimens as specified in Article 421.5., “Acceptance of Concrete.”

### 4.8.3.2. Strength Specimen Handling
Remove specimens from their molds and deliver Department test specimens to curing facilities within 24 to 48 hr. after molding, in accordance with pertinent test procedures unless otherwise shown on the plans or directed. Clean and prepare molds for reuse if necessary.

### 5. ACCEPTANCE OF CONCRETE

The Engineer will sample and test the fresh and hardened concrete for acceptance. The test results will be reported to the Contractor and the concrete supplier. Investigate the quality of the materials, the concrete production operations, and other possible problem areas to determine the cause for any concrete that fails to meet the required strengths as outlined below. Take necessary actions to correct the problem including redesign of the concrete mix. The Engineer may suspend all concrete operations under the pertinent Items if the Contractor is unable to identify, document, and correct the cause of the low strengths in a timely manner. Resume concrete operations only after obtaining approval for any proposed corrective actions. Concrete failing to meet the required strength as outlined below will be evaluated using the procedures listed in Article 421.6., “Measurement and Payment.”

#### 5.1. Structural Class of Concrete
For concrete classes identified as structural concrete in Table 8, the Engineer will make and test 7-day and 28-day specimens. Acceptance will be based on attaining the design strength given in Table 8.

#### 5.2. Class P and Class HES
The Engineer will base acceptance in accordance with Item 360, “Concrete Pavement,” and Item 361, “Repair of Concrete Pavement.”

#### 5.3. All Other Classes of Concrete
For concrete classes not identified as structural concrete in Table 8, the Engineer will make and test 7-day specimens. The Engineer will base acceptance on the 7-day target value established in accordance with Section 421.4.3., “Concrete Trial Batches.”

### 6. MEASUREMENT AND PAYMENT

The work performed, materials furnished, equipment, labor, tools, and incidentals will not be measured or paid for directly but will be subsidiary to pertinent Items.

The following procedure will be used to evaluate concrete where one or more project acceptance test specimens fail to meet the required design strength specified in this Item or on the plans:

- The concrete for a given placement will be considered structurally adequate and accepted at full price if the average of all test results for specimens made at the time of placement meets the required design strength provided no single test result is less than 85% of the required design strength.
- The Engineer will perform a structural review of the concrete to determine its adequacy to remain in service if the average of all test results for specimens made at the time of placement is less than the required design strength or if any test results are less than 85% of the required design strength. If the in-situ concrete strength is needed for the structural review, take cores at locations designated by the
Engineer in accordance with Tex-424-A. The Engineer will test the cores. The coring and testing will be at the Contractor’s expense.

- If all of the tested cores meet the required design strength, the concrete will be paid for at full price.
- If any of the tested cores do not meet the required design strength, but the average strength attained is determined to be structurally adequate, the Engineer will determine the limits of the payment adjustment using the following formula:

\[ A = B_p \left[ -5.37 \left( \frac{S_d}{S_r} \right)^2 + 11.69 \left( \frac{S_d}{S_r} \right) - 5.32 \right] \]

where:

- \( A \) = Amount to be paid per unit of measure for the entire placement in question
- \( S_d \) = Actual average strength from cylinders or cores. Use values from cores, if taken.
- \( S_r \) = Minimum required strength (specified)
- \( B_p \) = Unit Bid Price

- If the structural review determines the concrete is not adequate to remain in service, the Engineer will determine the limits of the concrete to be removed.
- The decision to reject structurally inadequate concrete or to apply the payment adjustment factor will be made no later than 56 days after placement.
Item 440
Reinforcement for Concrete

1. DESCRIPTION

Furnish and place reinforcement of the type, size, and details shown on the plans.

2. MATERIALS

Use deformed steel bar reinforcement unless otherwise specified or allowed.

2.1. Approved Mills. Before furnishing steel, producing mills of reinforcing steel for the Department must be pre-approved in accordance with DMS-7320, "Qualification Procedure for Reinforcing Steel Producing Mills," by the Construction Division. The Department's MPL has a list of approved producing mills. Reinforcing steel obtained from unapproved sources will not be accepted.

Contact the Construction Division with the name and location of the producing mill for stainless reinforcing steel, low carbon/chromium reinforcing steel, or dual-coated reinforcing steel at least 4 weeks before ordering any material.

2.2. Deformed Steel Bar Reinforcement. Provide deformed reinforcing steel conforming to one of the following:

- ASTM A615, Grades 60, 75, or 80;
- ASTM A996, Type A, Grade 60;
- ASTM A996, Type R, Grade 60, permitted in concrete pavement only (Furnish ASTM A996, Type R bars as straight bars only and do not bend them. Bend tests are not required.); or
- ASTM A706, Grades 60 or 80.

Provide the grade of reinforcing steel shown on the plans. Provide Grade 60 if no grade is shown.

The nominal size, area, and weight of reinforcing steel bars this item covers are shown in Table 1.

<table>
<thead>
<tr>
<th>Bar Size Number (in.)</th>
<th>Diameter (in.)</th>
<th>Area (sq. in.)</th>
<th>Weight per Foot (lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0.375</td>
<td>0.11</td>
<td>0.375</td>
</tr>
<tr>
<td>4</td>
<td>0.500</td>
<td>0.20</td>
<td>0.668</td>
</tr>
<tr>
<td>5</td>
<td>0.625</td>
<td>0.31</td>
<td>1.043</td>
</tr>
<tr>
<td>6</td>
<td>0.750</td>
<td>0.44</td>
<td>1.502</td>
</tr>
<tr>
<td>7</td>
<td>0.875</td>
<td>0.60</td>
<td>2.044</td>
</tr>
<tr>
<td>8</td>
<td>1.000</td>
<td>0.79</td>
<td>2.670</td>
</tr>
<tr>
<td>9</td>
<td>1.128</td>
<td>1.00</td>
<td>3.400</td>
</tr>
<tr>
<td>10</td>
<td>1.270</td>
<td>1.27</td>
<td>4.303</td>
</tr>
<tr>
<td>11</td>
<td>1.410</td>
<td>1.56</td>
<td>5.313</td>
</tr>
<tr>
<td>14</td>
<td>1.693</td>
<td>2.25</td>
<td>7.850</td>
</tr>
<tr>
<td>18</td>
<td>2.257</td>
<td>4.00</td>
<td>13.60</td>
</tr>
</tbody>
</table>

2.3. Smooth Steel Bar Reinforcement. Provide smooth bars for concrete pavement with a yield strength of at least 60 ksi and meeting ASTM A615. Provide steel conforming to ASTM A615 or meet the physical requirements of ASTM A36 for smooth bars that are larger than No. 3. Designate smooth bars by size number up to No. 4 and by diameter in inches above No. 4.
2.4. **Spiral Reinforcement.** Provide bars or wire for spiral reinforcement of the grade and minimum size or gauge shown on the plans.

Provide smooth or deformed wire conforming to ASTM A1064. Provide bars conforming to ASTM A615; ASTM A996, Type A; or ASTM A675, Grade 80, meeting dimensional requirements of ASTM A615.

2.5. **Weldable Reinforcing Steel.** Provide reinforcing steel conforming to ASTM A706 or with a maximum carbon equivalent (C.E.) of 0.55% if welding of reinforcing steel is required or desired. Provide a report showing the percentages of elements necessary to establish C.E. for reinforcing steel that does not meet ASTM A706, in order to be structurally welded. These requirements do not pertain to miscellaneous welds on reinforcing steel as defined in Section 448.4.2.1.1., "Miscellaneous Welding Applications."

Calculate C.E. using the following formula:

\[
C.E. = \%C + \frac{\%Mn}{6} + \frac{\%Cu}{40} + \frac{\%Ni}{20} + \frac{\%Cr}{10} - \frac{\%Mo}{50} - \frac{\%V}{10}
\]

Do not weld stainless reinforcing steel without permission from the Engineer. Provide stainless reinforcing steel suitable for welding, if required, and submit welding procedures and electrodes to the Engineer for approval.

2.6. **Welded Wire Reinforcement.** Provide welded wire reinforcement (WWR) conforming to ASTM A1064. Observe the relations shown in Table 2 among size number, diameter in inches, and area when ordering wire by size numbers, unless otherwise specified. Precede the size number for deformed wire with "D" and for smooth wire with "W."

Designate WWR as shown in the following example: 6 × 12 – W16 × W8 (indicating 6-in. longitudinal wire spacing and 12-in. transverse wire spacing with smooth No. 16 wire longitudinally and smooth No. 8 wire transversely).
<table>
<thead>
<tr>
<th>Size Number (in.)</th>
<th>Diameter (in.)</th>
<th>Area (sq. in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>31</td>
<td>0.628</td>
<td>0.310</td>
</tr>
<tr>
<td>30</td>
<td>0.610</td>
<td>0.300</td>
</tr>
<tr>
<td>29</td>
<td>0.597</td>
<td>0.280</td>
</tr>
<tr>
<td>28</td>
<td>0.575</td>
<td>0.260</td>
</tr>
<tr>
<td>26</td>
<td>0.556</td>
<td>0.240</td>
</tr>
<tr>
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<td>16</td>
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<td>1.2</td>
<td>0.325</td>
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</tr>
<tr>
<td>0.5</td>
<td>0.321</td>
<td>0.050</td>
</tr>
</tbody>
</table>

Note—Size numbers (in.) are the nominal cross-sectional area of the wire in hundredths of a square inch. Fractional sizes between the sizes listed above are also available and acceptable for use.

2.7. **Epoxy Coating.** Provide epoxy coated reinforcing steel as shown on the plans. Before furnishing epoxy coated reinforcing steel, an epoxy applicator must be pre-approved in accordance with DMS-7330, “Qualification Procedure for Reinforcing Steel Epoxy Coating Applicators.” The Department’s MPL has a list of approved applicators.

Furnish coated reinforcing steel meeting the requirements in Table 3.

<table>
<thead>
<tr>
<th>Material</th>
<th>Specification</th>
</tr>
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<tbody>
<tr>
<td>Bar</td>
<td>ASTM A775 or A834</td>
</tr>
<tr>
<td>Wire or WWR</td>
<td>ASTM A884 Class A or B</td>
</tr>
<tr>
<td>Mechanical couplers</td>
<td>As shown on the plans</td>
</tr>
<tr>
<td>Hardware</td>
<td>As shown on the plans</td>
</tr>
</tbody>
</table>

Use epoxy coating material and coating repair material that complies with DMS-8130, “Epoxy Powder Coating for Reinforcing Steel.” Patch no more than 1/4-in. total length in any foot at the applicator’s plant.

Maintain identification of all reinforcing steel throughout the coating and fabrication process and until delivery to the project site.

Furnish 1 copy of a written certification verifying the coated reinforcing steel meets the requirements of this item and 1 copy of the manufacturer’s control tests.

2.8. **Mechanical Couplers.** Use couplers of the type specified in DMS-4510, “Mechanical Couplers for Reinforcing Steel,” Article 4510,5,A, “General Requirements,” when mechanical splices in reinforcing steel bars are shown on the plans.
Furnish only couplers pre-qualified in accordance with DMS-4510, “Mechanical Couplers for Reinforcing Steel.” Ensure sleeve-wedge type couplers are not used on coated reinforcing. Sample and test couplers for use on individual projects in accordance with DMS-4510, “Mechanical Couplers for Reinforcing Steel.” Furnish couplers only at locations shown on the plans.

Furnish couplers for stainless reinforcing steel with the same alloy designation as the reinforcing steel.

2.9. **Fibers.** Supply fibers conforming to DMS-4550 “Fibers for Concrete” at the minimum dosage listed in the Department’s MPL, when allowed by the plans. Use non-metallic fibers when shown on the plans.

2.10. **Stainless Reinforcing Steel.** Provide deformed steel bars of the types listed in Table 4 and conforming to ASTM A955, Grade 60 or higher when stainless reinforcing steel is required on the plans.

<table>
<thead>
<tr>
<th>UNS Designation</th>
<th>S31653</th>
<th>S31803</th>
<th>S24100</th>
<th>S32304</th>
</tr>
</thead>
<tbody>
<tr>
<td>AISI Type</td>
<td>316LN</td>
<td>2205</td>
<td>XM-28</td>
<td>2304</td>
</tr>
</tbody>
</table>

2.11. **Low Carbon/Chromium Reinforcing Steel.** Provide deformed steel bars conforming to ASTM A1035, Grade 100 when low carbon/chromium reinforcing steel is required on the plans.

2.12. **Dual-Coated Reinforcing Steel.** Provide deformed bars conforming to ASTM A1055, Grade 60 or higher when dual-coated reinforcing steel is required on the plans.

2.13. **Glass Fiber Reinforced Polymer Bars (GFRP).** Provide bars conforming to the AASHTO LRFD Bridge Design Guide Specifications for GFRP-Reinforced Concrete Bridge Decks and Traffic Railings, Section 4, ‘Material Specifications’ when GFRP bars are required on the plans. Provide sample certification demonstrating the GFRP bar supplier has produced bar that meets the Material Specifications 2 mo. before fabrication. Furnish certification upon shipment that the GFRP bar supplied meets the Material Specifications.

3. **CONSTRUCTION**

3.1. **Bending.** Fabricate reinforcing steel bars as prescribed in the CRSI Manual of Standard Practice to the shapes and dimensions shown on the plans. Fabricate in the shop if possible. Field-fabricate, if permitted, using a method approved by the Engineer. Replace improperly fabricated, damaged, or broken bars at no additional expense to the Department. Repair damaged or broken bars embedded in a previous concrete placement using a method approved by the Engineer.

Unless otherwise shown on the plans, the inside diameter of bar bends, in terms of the nominal bar diameter (d), must be as shown in Table 5.

<table>
<thead>
<tr>
<th>Bend Description</th>
<th>Bar Size Number (in.)</th>
<th>Pin Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bends of 90° and greater in stirrups, ties, and other secondary bars that enclose another bar in the bend</td>
<td>3, 4, 5</td>
<td>4d</td>
</tr>
<tr>
<td></td>
<td>6, 7, 8</td>
<td>6d</td>
</tr>
<tr>
<td>Bends in main bars and in secondary bars not covered above</td>
<td>9, 10, 11</td>
<td>8d</td>
</tr>
<tr>
<td></td>
<td>14, 18</td>
<td>10d</td>
</tr>
</tbody>
</table>

Bend-test representative specimens as described for smaller bars in the applicable ASTM specification where bending No. 14 or No. 18 Grade 60 bars is required. Make the required 90° bend around a pin with a diameter of 10 times the nominal diameter of the bar.

Bend stainless reinforcing steel in accordance with ASTM A955.

3.2. **Tolerances.** Fabrication tolerances for bars are shown in Figure 1.
3.3. **Storage.** Store reinforcement above the ground on platforms, skids, or other supports, and protect it from damage and deterioration. Ensure reinforcement is free from dirt, paint, grease, oil, and other foreign materials when it is placed in the work. Use reinforcement free from defects such as cracks and delaminations. Rust, surface seams, surface irregularities, or mill scale will not be cause for rejection if the minimum cross-sectional area of a hand wire-brushed specimen meets the requirements for the size of steel specified.

Do not allow stainless reinforcing steel to be in direct contact with uncoated reinforcing steel, nor with galvanized reinforcing steel. This does not apply to stainless steel wires and ties. Store stainless reinforcing steel separately, off the ground on wooden supports.

3.4. **Splices.** Lap-splice, weld-splice, or mechanically splice bars as shown on the plans. Additional splices not shown on the plans will require approval. Splices not shown on the plans will be permitted in slabs no more than 15 in. in thickness, columns, walls, and parapets.

- Do not splice bars less than 30 ft. in plan length unless otherwise approved. For bars exceeding 30 ft. in plan length, the distance center-to-center of splices must be at least 30 ft. minus 1 splice length, with no more than 1 individual bar length less than 10 ft. Make lap splices not shown on the plans, but otherwise...
permitted, in accordance with Table 6. Maintain the specified concrete cover and spacing at splices, and place the lap-spliced bars in contact, securely tied together.

**Table 6**

<table>
<thead>
<tr>
<th>Bar Size Number (In.)</th>
<th>Uncoated Lap Length</th>
<th>Coated Lap Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1 ft. 4 in.</td>
<td>2 ft. 0 in.</td>
</tr>
<tr>
<td>4</td>
<td>1 ft. 9 in.</td>
<td>2 ft. 8 in.</td>
</tr>
<tr>
<td>5</td>
<td>2 ft. 2 in.</td>
<td>3 ft. 3 in.</td>
</tr>
<tr>
<td>6</td>
<td>2 ft. 7 in.</td>
<td>3 ft. 11 in.</td>
</tr>
<tr>
<td>7</td>
<td>3 ft. 5 in.</td>
<td>5 ft. 2 in.</td>
</tr>
<tr>
<td>8</td>
<td>4 ft. 6 in.</td>
<td>6 ft. 9 in.</td>
</tr>
<tr>
<td>9</td>
<td>5 ft. 8 in.</td>
<td>8 ft. 6 in.</td>
</tr>
<tr>
<td>10</td>
<td>7 ft. 3 in.</td>
<td>10 ft. 11 in.</td>
</tr>
<tr>
<td>11</td>
<td>8 ft. 11 in.</td>
<td>13 ft. 5 in.</td>
</tr>
</tbody>
</table>

- Do not lap No. 14 or No. 18 bars.
- Lap spiral steel at least 1 turn.
- Splice WWR using a lap length that includes the overlap of at least 2 cross wires plus 2 in. on each sheet or roll. Splices using bars that develop equivalent strength and are lapped in accordance with Table 6 are permitted.
- Lap the existing longitudinal bars with the new bars as shown in Table 6 for box culvert extensions with less than 1 ft. of fill. Lap at least 1 ft. 0 in. for extensions with more than 1 ft. of fill.
- Ensure welded splices conform to the requirements of the plans and of Item 448, "Structural Field Welding." Field-prepare ends of reinforcing bars if they will be butt-welded. Delivered bars must be long enough to permit weld preparation.
- Install mechanical coupling devices in accordance with the manufacturer’s recommendations at locations shown on the plans. Protect threaded male or female connections, and ensure the threaded connections are clean when making the connection. Do not repair damaged threads.
- Mechanical coupler alternate equivalent strength arrangements, to be accomplished by substituting larger bar sizes or more bars, will be considered if approved in writing before fabrication of the systems.

3.5. **Placing.** Place reinforcement as near as possible to the position shown on the plans. Do not vary bars from plan placement by more than 1/12 of the spacing between bars in the plane of the bar parallel to the nearest surface of concrete. Do not vary bars from plan placement by more than 1/4 in in the plane of the bar perpendicular to the nearest surface of concrete. Provide a minimum 1-in. clean cover of concrete to the nearest surface of bar unless otherwise shown on the plans.

For bridge slabs, the clear cover tolerance for the top mat of reinforcement is -0, +1/2 in.

Locate the reinforcement accurately in the forms, and hold it firmly in place before and during concrete placement by means of bar supports that are adequate in strength and number to prevent displacement and keep the reinforcement at the proper distance from the forms. Provide bar supports in accordance with the CRSI *Manual of Standard Practice*. Use Class 1 supports, approved plastic bar supports, precast mortar, or concrete blocks when supports are in contact with removable or stay-in-place forms. Use Class 3 supports in slab overlays on concrete panels or on existing concrete slabs. Bar supports in contact with soil or subgrade must be approved.

Use Class 1A supports with epoxy coated reinforcing steel. Provide epoxy or plastic coated tie wires and clips for use with epoxy coated reinforcing steel.

Use mortar or concrete with a minimum compressive strength of 5,000 psi for precast bar supports. Provide a suitable tie wire in each block for anchoring to the bar.

Place individual bar supports in rows at 4-ft. maximum spacing in each direction. Place continuous type bar supports at 4-ft. maximum spacing. Use continuous bar supports with permanent metal deck forms.
The exposure of the ends of longitudinals, stirrups, and spacers used to position the reinforcement in concrete pipe and storm drains is not cause for rejection.

Tie reinforcement for bridge slabs and top slabs of direct traffic culverts at all intersections, except tie only alternate intersections where spacing is less than 1 ft. in each direction. Tie the bars at enough intersections to provide a rigid cage of reinforcement for reinforcement cages for other structural members. Fasten mats of WVR securely at the ends and edges.

Clean mortar, mud, dirt, debris, oil, and other foreign material from the reinforcement before concrete placement. Do not place concrete until authorized.

Stop placement until corrective measures are taken if reinforcement is not adequately supported or tied to resist settlement, reinforcement is floating upward, truss bars are overturning, or movement is detected in any direction during concrete placement.

3.6. Handling, Placing, and Repairing Epoxy Coated Reinforcing Steel.

3.6.1. Handling. Provide systems for handling coated reinforcing steel with padded contact areas. Pad bundling bands or use suitable banding to prevent damage to the coating. Lift bundles of coated reinforcement with a strongback, spreader bar, multiple supports, or a platform bridge. Transport the bundled reinforcement carefully, and store it on protective cribbing. Do not drop or drag the coated reinforcement.

3.6.2. Placing. Do not flame-cut coated reinforcement. Saw or shear-cut only when approved. Coat cut ends as specified in Section 440.3.6.3., "Repairing Coating."

Do not weld or mechanically couple coated reinforcing steel except where specifically shown on the plans. Remove the epoxy coating at least 6 in. beyond the weld limits before welding and 2 in. beyond the limits of the coupler before assembly. Clean the steel of oil, grease, moisture, dirt, welding contamination (slag or acid residue), and rust to a near-white finish after welding or coupling. Check the existing epoxy for damage. Remove any damaged or loose epoxy back to sound epoxy coating.

Coat the splice area after cleaning with epoxy repair material to a thickness of 7 to 17 mils after curing. Apply a second application of repair material to the bar and coupler interface to ensure complete sealing of the joint.

3.6.3. Repairing Coating. Use material that complies with the requirements of this item and ASTM D3963 for repairing of the coating. Make repairs in accordance with procedures recommended by the manufacturer of the epoxy coating powder. Apply at least the same coating thickness as required for the original coating for areas to be patched. Repair all visible damage to the coating.

Repair sawed and sheared ends, cuts, breaks, and other damage promptly before additional oxidation occurs. Clean areas to be repaired to ensure they are free from surface contaminants. Make repairs in the shop or field as required.

3.7. Handling and Placing Stainless Reinforcing Steel. Handle, cut, and place stainless reinforcing steel bar using tools that are not used on carbon steel. Do not use carbon steel tools, chains, slings, etc. when handling stainless steel. Use only nylon or polypropylene slings. Cut stainless steel reinforcing using shears, saws, abrasive cutoff wheels, or torches. Remove any thermal oxidation using pickling paste. Do not field bend stainless steel reinforcing without approval.

Use 16 gauge fully annealed stainless steel tie wire conforming to the material properties listed in Section 440.2.10., "Stainless Reinforcing Steel." Support all stainless reinforcing steel on solid plastic, stainless steel, or epoxy coated steel chairs. Do not use uncoated carbon steel chairs in contact with stainless reinforcing steel.
3.8. **Bending, Handling, Repairing, and Placing GFRP Bars.** Fabricate, handle, repair, and place GFRP bars in accordance with the AASHTO LRFD Bridge Design Guide Specifications for GFRP-Reinforced Concrete Bridge Decks and Traffic Railings, Section 5, Construction Specifications.

4. **MEASUREMENT AND PAYMENT**

The work performed, materials furnished, equipment, labor, tools, and incidentals will not be measured or paid for directly but will be considered subsidiary to pertinent items.
Item 466
Headwalls and Wingwalls

1. DESCRIPTION

Furnish, construct, and install concrete headwalls and wingwalls for drainage structures and underpasses.

2. MATERIALS

2.1. General. Furnish materials in accordance with the following.

- Item 420, “Concrete Substructures,"
- Item 421, “Hydraulic Cement Concrete,” and
- Item 440, “Reinforcement for Concrete.”

Use Class C concrete for cast-in-place and precast concrete units unless otherwise shown on the plans. Furnish cast-in-place or precast headwalls and wingwalls unless otherwise shown on the plans.

2.2. Fabrication.

2.2.1. General. Fabricate cast-in-place concrete units and precast units in accordance with Item 420 “Concrete Substructures.” Use the following definitions for headwalls and wingwalls:

- “Headwalls” refers to all walls, including wings, at the ends of single-barrel and multiple-barrel pipe culvert structures.
- “Wingwalls” refers to all walls at the ends of single-barrel or multiple-barrel box culvert structures.

2.2.2. Lifting Holes. Provide no more than 4 lifting holes in each section for precast units. Lifting holes may be cast, cut into fresh concrete after form removal, or drilled. Provide lifting holes large enough for adequate lifting devices based on the size and weight of the section. The maximum hole diameter is 3 in. at the inside surface of the wall and 4 in. at the outside surface. Cut no more than 1 longitudinal wire or 2 circumferential wires per layer of reinforcing steel when locating lift holes. Repair spalled areas around lifting holes.

2.2.3. Marking. Clearly mark each precast unit before shipment from the casting or fabrication yard with the following:

- the date of manufacture,
- the name or trademark of the manufacturer, and
- the type and size designation.

2.2.4. Storage and Shipment. Store precast units on a level surface. Do not place any loads on precast concrete units until design strength is reached. Do not ship units until design strength requirements have been met.

2.2.5. Causes for Rejection. Precast units may be rejected for not meeting any one of the specification requirements. Individual units may also be rejected for fractures or cracks passing through the wall or surface defects indicating honeycombed or open texture surfaces. Remove rejected units from the project, and replace them with acceptable units meeting the requirements of this Item.

2.2.6. Defects and Repairs. Occasional imperfections in manufacture or accidental damage sustained during handling may be repaired. The repaired units will be acceptable if they conform to the requirements of this Item and the repairs are sound, properly finished, and cured in conformance with pertinent specifications.
3. **CONSTRUCTION**

3.1. **General.** Remove portions of existing structures and drill, dowel, and grout in accordance with Item 420, "Concrete Substructures."

3.2. **Excavation, Shaping, Bedding, and Backfill.** Excavate, shape, bed, and backfill in accordance with Item 400, "Excavation and Backfill for Structures." Take special precautions in placing and compacting the backfill to avoid any movement or damage to the units. Bed precast units on foundations of firm and stable material accurately shaped to conform to the bases of the units.

3.3. **Placement of Precast Units.** Provide adequate means to lift and place the precast units. Fill lifting holes with mortar or concrete and cure. Precast concrete or mortar plugs may be used.

3.4. **Connections.** Make connections to new or existing structures in accordance with the details shown on the plans. Furnish jointing material in accordance with Item 464, "Reinforced Concrete Pipe," or as shown on the plans.

Remove a length of the existing pipe from the headwall to the joint when removing existing headwalls as shown on the plans or as approved. Re-lay the removed pipe if approved, or furnish and lay a length of new pipe.

4. **MEASUREMENT**

This is a plans quantity measurement item. The quantity to be paid is the quantity shown in the proposal unless modified by Article 9.2, "Plans Quantity Measurement." Additional measurements or calculations will be made if adjustments of quantities are required.

4.1. **Headwalls.** Headwalls will be measured by each end of a structure.

4.2. **Wingwalls.** Wingwalls will be measured by one of the following methods:

4.2.1. **Square Foot.** Wingwalls will be measured by the square foot of the front surface area of the wall of each type. The area will be measured from the top of the footing or apron to the top of the wall unless otherwise shown on the plans. If there is no footing or apron, then measurement is from the bottom of the wall.

4.2.2. **Each.** Wingwalls will be measured by each end of a structure.

5. **PAYMENT**

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the price bid for "Headwalls" of the type and pipe size (diameter or design) specified, "Wingwalls" of the type specified when measurement is by the square foot, or "Wingwalls" of the type and wall height specified when measurement is by each. For payment purposes, the wingwall height will be rounded to the nearest foot. All wingwalls and headwalls of the same type will be paid for equally when skew does not affect the type. This price is full compensation for constructing, furnishing, transporting, and installing the headwalls or wingwalls; connecting to existing structure; breaking back, removing and disposing of portions of the existing structure, and replacing portions of the existing structure as required to make connections; excavation and backfill; and concrete, reinforcing steel, corrugated metal pipe or reinforced concrete pipe, equipment, labor, tools, and incidentals.

Apron concrete or riprap between or around the wingwalls of single- or multiple-barrel box culvert structures will be measured and paid for in accordance with Item 432, "Riprap."

The removal and re-laying of existing pipe or the furnishing of new pipe to replace existing pipe will not be paid for directly but will be considered subsidiary to this Item.
## ENVIRONMENTAL ASSESSMENT INFORMATION

<table>
<thead>
<tr>
<th>MONTH</th>
<th>MEAN NUMBER DAYS PRECIPITATION (0.01” OR MORE)</th>
<th>NORMAL PRECIPITATION (WATER EQUIVALENT) (INCHES)</th>
<th>MEAN NUMBER DAYS SNOWFALL (INCLUDING ICE PELLETS/SLEET) (1.0” OR MORE)</th>
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<tr>
<td>JANUARY</td>
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<td>FEBRUARY</td>
<td>3.4</td>
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<td>MARCH</td>
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<td>APRIL</td>
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<tr>
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<tr>
<td>DECEMBER</td>
<td>3.6</td>
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<td>1.5</td>
</tr>
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**ANNUALLY**: 52.4  14.80  1.9

This table is based on information from NOAA and measured at the Midland International Air Terminal, Midland, Texas.

Means are based on records covering a period of 30 years. Normals based on record from 1975 - 2004.

T = trace amount.

**END OF DOCUMENT 00 31 24**
GEOTECHNICAL INVESTIGATION

NEW EXHIBITION HALL

MIDLAND COUNTY HORSESHOE COMPLEX

MIDLAND, TEXAS
GEOTECHNICAL INVESTIGATION
NEW EXHIBITION HALL
MIDLAND COUNTY HORSESHOE COMPLEX
MIDLAND, TEXAS

prepared for
THE HONORABLE MIKE BRADFORD
MIDLAND COUNTY JUDGE
MIDLAND, TEXAS
and
MR. MARK PELLETIER
VANDERGRIFF GROUP ARCHITECTS, PC
MIDLAND, TEXAS

JUNE 22, 2012
PROJECT NO. 7320512

prepared by

William C. Hamilton, P.E.
Vice-President

Julie H. Perez, E.I.T.
Graduate Engineer
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GEOTECHNICAL INVESTIGATION

NEW EXHIBITION HALL

MIDLAND COUNTY HORSESHOE COMPLEX

MIDLAND, TEXAS

INTRODUCTION

General: This geotechnical investigation at the site of a proposed new exhibition hall in Midland, Texas, was authorized by signed agreement dated May 8, 2012, by The Honorable Mike Bradford, Midland County Judge, Midland, Texas, and was performed in general accordance with our letter proposal dated April 26, 2012.

The purpose of this investigation has been to explore subsurface conditions at the site, to conduct field and laboratory tests to characterize the physical soil properties, to provide design and construction recommendations to assist the structural engineer in the design of the foundation system for the structure, and to provide pavement section and construction recommendations for the pavement areas.

The site is located on the grounds of the Midland County Horseshoe complex northwest of the intersection of IH-20 and Cotton Flat Road in Midland, Texas. The general location of the site is shown on the site vicinity map on Plate I in Appendix A.

Existing Site Conditions: The site was covered with hot mix asphaltic paving or sparse grasses at the time of the geotechnical drilling operations. No previous use of the site was evident or made known to W. C. Hamilton Engineering at the time this report was prepared.

Subsurface Exploration: Subsurface materials at the site were explored by a total of five borings at locations selected by Vandergriff Group Architects personnel. The borings were
drilled to a maximum depth of 20.0 feet. The approximate boring locations are shown on Plate I in Appendix A. Field drilling operations were completed with the plugging of the holes on May 14 2012.

The borings were advanced using continuous sampling techniques. The materials were monitored during the drilling operations at the direction of the geotechnical engineer for any signs of physical changes in the materials. A thin-wall steel push tube sampler was used to obtain undisturbed samples at the depths indicated on the Logs of Boring. These samples were visually examined, identified, wrapped and sealed in plastic, when appropriate, and placed in core boxes for transportation to the laboratory. An auger bit was used to advance each boring the remaining depth of the hole.

Pocket penetrometer readings were taken in the field on the push tube samples as the samples were extruded from the push tubes. This test is a quick method for determining the relative consistencies of the samples and gives an indication of the relative strengths of the samples. These test results are shown on the Logs of Boring in Appendix B in the "test" column.

The Standard Penetration (SPT) Test, ASTM D1586, was conducted at various intervals of depth during the exploration to aid in strength evaluations. This test procedure drops a 140 pound hammer from a height of 30 inches to advance a split barrel drive point. Depending on the resistance of the materials to penetration by the drive point, either the number of blows required to advance the drive point 12 inches, 50 blows resulting in six inches or less penetration, or the inches of penetration due to 100 blows is recorded. Results of the SPT tests are shown on the left-hand side of the Logs of Boring. The SPT samples were visually examined, identified, and wrapped and sealed in plastic for transportation to the laboratory.

Samples obtained from the field operations that were not utilized in the laboratory testing will be stored for 30 days from the date of this report. After that time they will be discarded unless written notification is received.
**Laboratory Testing:** The soil samples were returned to the laboratory where they were re-examined and the visual classifications checked by the geotechnical engineer. Selected specimens were chosen for testing to identify their soil classifications and natural moisture contents. The specific tests conducted are summarized as follows:

- Atterberg Limits Tests
- Percent Passing No. 200 Sieve Tests
- Natural Moisture Content Tests

The Atterberg Limits tests, percent passing No. 200-mesh sieve tests, and natural moisture content tests were used to evaluate the basic engineering properties of the soil. The results of these tests and the classifications of the subsurface materials are shown in the summary on Plate II in Appendix A. The soil classifications refer to the Unified Soil Classification System per ASTM D2487.

**Summary:** The results from the field exploration and the laboratory investigation were utilized in an engineering study to develop recommendations for the design of the building and pavement foundation systems. These evaluations and recommendations are discussed in the following sections.
SUBSURFACE MATERIALS AND CONDITIONS

Stratification: Specific types and depths of the subsurface strata encountered in the borings are shown on the attached Logs of Boring in Appendix B. In general, the subsurface materials encountered from the ground surface down consisted of:

Stratum I Pavement Section comprised of Hot Mix Asphaltic Concrete (HMAC) and millings 9 to 10 inches in thickness in Boring Nos. B-1 and B-2 only;

Stratum II Reddish Brown or Tan CLAYEY SAND with Calcareous Particles or SANDY LEAN CLAY 1.2 to 8.25 feet in thickness;

Stratum III Tan CALICHE (some rock-like) at least to the bottoms of the borings.

Material Characteristics: The results of the pocket penetrometer tests and the SPT tests indicate that the CLAYEY SANDS were medium dense to dense in relative density. The SANDY LEAN CLAYS were medium stiff in consistency. The CALICHES were mixtures of silts, sands, clays and calcareous particles (particle size ranged from gravel to cobble size) in a matrix of calcium carbonate cement. The CALICHES were in a poorly-cemented to well-cemented condition. Excavations into the CALICHES will be difficult.

Subsurface Water Conditions: The borings were advanced to a depth of 20.0 feet using dry sampling techniques. Groundwater was not encountered in the borings during the drilling operations. Notes on groundwater observations are contained on the Logs of Boring in Appendix B.

Be aware that these limited observations do not represent a groundwater study which was beyond the scope of this investigation, and that due to the nature of subsurface water and its relationship to climatic influences, the groundwater may be intermittent and of varying quantities and depths due to changes in the seasonal moisture content.
**Shrink/Swell Potential:** The tendency for a soil to shrink and swell with changes in soil moisture content is a function of the clay content and the type of clay mineral. These are reflected in soil consistency as indicated by the liquid limit and plasticity index of the Atterberg Limits tests. A generalized relationship between shrink/swell potential and the soil plasticity index (P.I.) is shown as follows:

**General Relationship Between P.I. and Shrink/Swell Potential**

<table>
<thead>
<tr>
<th>P.I. Range</th>
<th>Shrink/Swell Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 15</td>
<td>Low</td>
</tr>
<tr>
<td>15 to 25</td>
<td>Medium</td>
</tr>
<tr>
<td>25 to 35</td>
<td>High</td>
</tr>
<tr>
<td>&gt;35</td>
<td>Very High</td>
</tr>
</tbody>
</table>

The amount of expansion that will actually occur with increases in soil moisture content is inversely related to the overburden pressure; that is, the larger the overburden pressure, the smaller the amount of expansion. Near-surface soils are thus susceptible to shrink/swell behavior because of the low overburden pressures. Shrink/swell behavior is normally considered to be limited to the upper 15 feet (zone of seasonal moisture changes) of the various soil formations. Overall, the materials encountered at this site possess low shrink/swell potential.

**Frost Depth:** The published frost depth for the area is four inches.

**Seismic Zone:** According to the *Uniform Building Code*, the area rests in seismic zone zero. The *International Building Code-03* site classification is D/C.
FOUNDATION DESIGN RECOMMENDATIONS

General: Plans call for the construction of a single-story structure encompassing approximately 100,000 square feet, along with paved parking areas and drives. The structural loads associated with the project are anticipated to be moderate in intensity.

Potential Soil Movements: McDowell's potential vertical rise (PVR) procedure (Reference 1) has been used to estimate the possible magnitude of shrink/swell movements at the site. The results indicate possible shrink/swell movements over the site to be up to ½ inch with the soil moisture changing from a "dry" to a "wet" soil moisture content due to seasonal soil moisture variations. It should be noted that this method utilizes correlations of soil types to swell potential and as such, the results must be considered as giving approximate values of the shrink/swell potential.

The materials encountered in the borings were generally in a state that is not susceptible to classic consolidation settlement. Footings designed using the recommended design values will be subject to settlement of less than one inch total and one-half inch differential settlement.

Also, be aware that these potential soil movement estimates are indicative of the relative magnitude of probable movement under seasonal changes in soil moisture content. Soil movements in excess of these values due to either expansion or consolidation may be expected if increases in soil moisture content occur as a result of broken water and sewer lines, improper drainage of surface water, shrubbery and trees planted near the foundation, excessive lawn or shrubbery irrigation, or ponding of water near the foundation. These movement potentials must be considered in the design of the foundation support system.

Structural Load Support: Based on the materials encountered in the borings, shallow spread, mat type, or continuous footings will provide satisfactory support for the proposed structure. Footings founded at a minimum depth of 2.5 feet below the existing ground surface at the time of the geotechnical drilling operations, or at the surface of the tan rock-like caliche if
encountered at a shallower depth, may be sized using a net allowable loading intensity of 4,000 pounds per square foot. This value provides for a factor of safety of three against a general shear failure at this depth.

Should fill material placement be required for site work improvements such that the footing depth becomes relatively deep, footings may be designed using a net value of 3,500 pounds per square foot at a minimum depth of 2.5 feet below the finished grade elevation. The footings should be founded on compacted select fill material or the natural subgrade prepared and placed as described in the Foundation Construction Criteria section of this report. This value also provides for a factor of safety of three against a general shear failure in the material specified.

**Interior Floor Slab Considerations:** The subsurface materials appear suitable for support of a typical lightly-loaded floor slab system. The Foundation Construction Criteria section of this report should be consulted for recommendations for preparation of the subgrade and the addition of fill material, if required.

Floor slab areas subjected to heavy floor loading or forklift traffic will require special consideration. These floor slabs should be designed as pavements. A “cushion sand” is not recommended for these type slabs.

**Lateral Load Resistance:** The structure will impart lateral loads outward from the base of the footings. These lateral loads will be resisted by the weight of the footings, the weight of the soil placed above the footings, frictional resistance between the contact area of the footing base and the soil, and passive earth pressures of the soil against the outer side area of the footings.

The passive earth pressure resistance for each foot of width of the footing may be calculated using the following formula:
\[ P_p = 0.5\gamma H^2 + 2CH \]

where
- \( P_p \) = Ultimate resultant force per foot of width of the footing (lbs)
- \( \gamma \) = Unit weight of soil (pcf)
- \( C \) = Cohesion (psf)
- \( H \) = Soil/footing contact height (ft)

The following are recommended soil values for use:

- \( \gamma \) = 115 pcf
- \( C \) = 250 psf

A factor of safety of at least 1.5 is recommended.

**Lateral Earth Pressures:** Walls below grade, if required, will be acted upon by lateral earth pressures. The magnitude of the lateral earth pressures will be a function of the type of materials used as backfill, compaction achieved during placement, placement method, and specifics of the wall design (i.e., smooth wall, rough wall, braced, battered, height of wall, finished grade, etc.).

If the top of the wall is allowed to move slightly, then the "active" Rankine lateral earth pressure case will be developed. If the top of the wall is restrained against movement, then the "at rest" lateral earth pressure case will be developed. The following values are recommended for design purposes and reflect the average or mixed condition for on-site material:

<table>
<thead>
<tr>
<th>Material Type</th>
<th>At Rest Equivalent Fluid Pressure ( K_h )</th>
<th>Active Equivalent Fluid Pressure ( K_a )</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-site Material</td>
<td>60 lbs/ft²/lin ft</td>
<td>45 lbs/ft²/lin ft</td>
</tr>
</tbody>
</table>

These earth pressure values are for horizontal pressures on a vertical wall (not exceeding 15 feet in height) and do **not** include surcharge loading or hydrostatic pressure buildup.
OTHER DESIGN CONSIDERATIONS

Other Design Values: Based on the results of the plasticity index tests, sieve analyses, and correlations of the results with similar materials, the following are recommended design values for the properties of the on-site materials:

Angle of Internal Friction (Θ):
- CLAYEY SANDS:
- SANDY LEAN CLAYS: 15°
- CALICHES: 30°

Modulus of Subgrade Reaction for Mats and Slabs (pci)*: 300

Ultimate Friction Factor between
Soil and Base Concrete:
- (Unformed) 0.4 to 0.5
- (Formed) 0.3

Unit Weight of Soil: 115 pounds per cubic foot

*When prepared as recommended in the Foundation Construction Criteria section of this report
FOUNDATION CONSTRUCTION CRITERIA

Site Preparation: Prior to starting any work at the site it is recommended that proper construction drainage be provided to maintain a relatively dry condition. This will be very important if any work is attempted during periods of prolonged rainfall which occur seasonally in this area. Ponding of water at the site should be avoided during all phases of construction and post construction grading.

Due to the proximity of existing structures at the site, vibratory rollers are not recommended for this project.

Site preparation should begin by removing all surface vegetation and root systems to a minimum depth of six inches within the building areas and six inches within the pavement areas for a distance of five feet outside the building lines and two feet beyond pavement lines. Any existing concrete or Hot Mix Asphalitic Concrete (HMAC) surface (including millings) should be removed in the areas where any new structure will be placed. These materials should not be used for structural fill or in the building areas.

Tree stumps, if encountered, should be completely removed and backfilled. Backfilling should be accomplished in maximum eight-inch loose lifts and then compacted to a minimum of 95 percent of maximum density (ASTM D 698) at not less than two percentage points of optimum moisture. Compacted select, non-expansive fill material should be used to fill in stump holes.

After any existing concrete and HMAC (including millings) have been removed, the area should be backfilled with select fill material within the footprint of the proposed new structure. The material used should be of the type and compacted as specified in the Select Non-Expansive Fill Material section of this report.
The exposed surfaces for the building areas (when at proper subgrade) should be compacted to a minimum of 95 percent of ASTM D698 maximum density at not less than two percentage points of the optimum moisture content determined by this test. If any soft or weak areas are revealed, they should be removed and then replaced with compacted select fill prior to placement of fill or base material.

Any areas found not to comply with the compaction requirements should be reworked and retested prior to placing the next lift. A density test frequency of one test for every 2,500 square feet of building area is recommended.

Occasionally, the shallow soils become wet and pump during site preparation, and become difficult to work. This condition generally occurs with trapped moisture in the subgrade. If this condition occurs during construction, the soils need to be excavated, aerated to dry, and recompacted adequately. At times excavating and replacing with selected soils may be required to achieve an adequate subgrade.

**Select Non-Expansive Fill Material:** Fill material used should be the on-site material or a select non-expansive material meeting the following general requirements:

- **Maximum Aggregate Size** .............. 3.0 inches
- **Percent Retained on No. 4 Sieve** ........ 25-50
- **Percent Retained on No. 40 Sieve** ......... 50-85
- **Plasticity Index** .......................... 15 maximum

Other local materials that do not meet these requirements should be submitted to the geotechnical engineer for evaluation and testing prior to their use.

The fill material should be compacted to a minimum of 95 percent of ASTM D698 maximum density in maximum eight-inch loose lifts and tested for compliance prior to proceeding with subsequent lifts. Should fill material placement exceed 3.5 feet in depth, the density requirement should be increased to 98 percent of ASTM D698 maximum density. The moisture content should be maintained at or near the optimum moisture content as determined by ASTM D698,
and should not be less than two percentage points of the optimum moisture content determined by this test.

**Vapor Barrier:** A vapor barrier below the floor slab should be considered in areas where moisture sensitive floor coverings will be applied. The vapor barrier should be designed according to ACI criteria.

**Foundation Construction:** It is recommended that all footing excavations be inspected and checked by the owner's authorized representative for proper foundation supporting material and depth, proper dimensions, and proper reinforcement size and placement. Loose material should be removed from the excavation prior to the placement of steel and concrete. Foundation excavations should remain open only the minimum time necessary to permit good quality construction.

**Drainage Considerations:** Proper drainage should be provided away from the foundation elements during all phases of construction and post-construction grading. Proper drainage is essential to the long-term stability of the structure. Ponding of water near the foundation elements from improper grading, excessive landscape watering, or gutter downspouts should not be permitted.

**Backfill Compaction:** In the event that footings are constructed in such a manner that they require backfilling, the on-site material or a select material may be used as backfill. The material should be compacted to not less than 95 percent of maximum density (ASTM D698) in maximum six-inch lifts. The select material should have a plasticity index of 15 or less. Non-plastic materials should have at least 30 percent by weight passing the No. 200-mesh sieve. The maximum particle size should be less than two inches when hand compacted techniques are used. A three-inch maximum particle size is permissible when large construction equipment is utilized for backfill compaction. Backfill compaction consideration should also be given to any utility trenches within or near the construction area.
PAVEMENT DESIGN AND CONSTRUCTION CRITERIA

**Design Criteria:** The predominant subgrade providing support for the pavement areas should be the CLAYEY SANDS and SANDY LEAN CLAYS. Based on the laboratory tests and past experience with similar soils, the support strength of these materials has been estimated to have a Texas Triaxial Classification of 3.9 when compacted to at least 95 percent of AASHTO T180 density.

**Traffic Conditions and Pavement Thicknesses:** The total pavement thickness for any particular paved area will depend on the traffic characteristics as estimated by the number of 18-kip axle load repetitions. For this site, assuming parking areas will be primarily automobile and other light vehicles, the estimated design number of equivalent 18-kip axle load repetitions is 25,000.

The required pavement thicknesses have been selected using the *1993 AASHTO Guide for Design of Pavement Structures*. The required total pavement thickness and individual layer thicknesses for flexible and rigid pavement sections with assumptions are provided below:

### FLEXIBLE PAVEMENT

1. 18-Kip ESAL, $W_{18}$  
   Reliability, $R$  
   Overall Standard Deviation, $S_o$  
   Soil Resilient Modulus, $M_R$  
   Initial Serviceability, $p_o$  
   Terminal Serviceability, $p_t$  
   Design Structural Number, $SN$  

   25,000  
   80%  
   0.45  
   11,000 psi  
   4.1  
   2.25  
   1.45
2. Layer Coefficients
   Asphaltic Concrete Surface, \( a_1 \) 0.40
   Asphaltic Concrete Base, \( a_2 \) 0.25
   Base, \( a_3 \) 0.13

**Recommended Section**

1.5 inches of Hot Mix Asphaltic Concrete Surface Course (HMACS)
4.0 inches of Hot Mix Asphaltic Concrete Base Course (HMACB)
5.5 inches Total Constructed Pavement Thickness, above
6.0 inches of Compacted Subgrade

*or*

**Alternate Section**

2.0 inches of Hot Mix Asphaltic Concrete Surface Course (HMACS)
6.0 inches of Flexible Base Material
8.0 inches Total Constructed Pavement Thickness, above
6.0 inches of Compacted Subgrade

On truck delivery routes and areas, an additional one inch of HMACS and either one inch of HMACB (recommended section) or two inches of Flexible Base (alternate section) should be added to the selected pavement section.

**RIGID PAVEMENT**

Assumptions for rigid pavement section are the same as outlined previously except for the following additional assumptions:

1. Load Transfer, \( J = 4.1 \) (Assuming no load transfer devices in jointed pavement)
   Concrete Compressive Strength (28 days) = 3,000 psi
   Concrete Modulus of Elasticity = 3,600,000 psi
   Modulus of Rupture = 500 psi
   Overall Standard Deviation, \( S_o = 0.35 \)
   Modulus of Subgrade Reaction = 300 pci
The following rigid pavement section would be appropriate at this site:

5.0 inches of Portland Cement Concrete
6.0 inches of Compacted Subgrade

Reinforcing steel consisting of deformed steel re-bars (not wire mesh) should be used in concrete pavement at this site. Thickness selection is based on concrete flexural strength, soil modulus, and traffic volume. Selection of steel is dependent on joint spacing, slab thickness, and other factors as discussed in the Portland Cement Association publications.

**Construction Criteria:** The pavement should be specified, constructed, and tested to meet the following requirements:

1. Hot Mix Asphaltic Concrete Pavement - Texas Department of Transportation (TxDOT) Item 340, Type C or D, 1993 Specification, compacted to at least 93% of the Rice Specific Gravity (TEX Method 227-F).

2. Hot Mix Asphaltic Concrete Base - TxDOT Item 340, Type B, 1993 Specification, compacted to at least 93% of the Rice Specific Gravity (TEX Method 227-F) in maximum four-inch lifts.

3. Flexible Base Material - TxDOT Item 247, Type A, Grade 2, 1993 Specification. The material should be compacted to a minimum of 95% of AASHTO T180-74 density near optimum moisture content.

4. Compacted Subgrade - The subgrade beneath the pavements should be compacted to a minimum of 95% of AASHTO T180-74 density near optimum moisture content.

5. Portland Cement Concrete - Portland Cement Concrete should be specified to contain a minimum of 5.0 sacks of cement per cubic yard and minimum 3000 psi compressive strength at 28 days. Reinforcing steel is recommended for temperature and expansion control.

**Drainage:** Proper drainage of the paved areas, including minimization of ponding of water on the pavement surface, is essential to provide maximum pavement life.
LIMITATIONS OF THIS INVESTIGATION

The subsurface materials and conditions are known only at the specific boring locations and within the depths explored. Subsurface conditions have been extrapolated based on known conditions in the borings, and actual field conditions elsewhere at the site may differ from those described in this report due to geological, prior use, or other factors. For this reason, we recommend that the geotechnical engineer be retained through the construction phase to include plan review and to identify variations in subsurface materials and conditions and to confirm that the recommendations contained in this report are applicable to subsurface conditions encountered elsewhere on this site.

This report has been prepared based on a specific site and specific use. The geotechnical engineer must be consulted prior to this report being used for other than the specific project for which this report was written.

This report should not be copied without permission of the geotechnical engineer. When copied with his/her permission, the report should be copied in its entirety and in no case should the boring logs be separated from the body of the report.

It is recommended that the construction materials testing laboratory shall meet the basic requirements of ASTM E329, but as a minimum shall have demonstrated satisfactory performance in the AASHTO Materials Reference Laboratory Proficiency Sample Program in soils and concrete.
REFERENCES


## SUMMARY OF SOIL CLASSIFICATION TEST RESULTS

<table>
<thead>
<tr>
<th>Boring Number</th>
<th>Depth in Feet</th>
<th>Liquid Limit %</th>
<th>Plasticity Index %</th>
<th>% Passing 200-mesh Sieve</th>
<th>Natural Moisture Content %</th>
<th>Classification</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-1</td>
<td>2.5-4.0</td>
<td>21</td>
<td>9</td>
<td>43.8</td>
<td>11.2</td>
<td>SC</td>
<td>Reddish Brown CLAYEY SAND w/Calcereous Particles</td>
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<tr>
<td>B-1</td>
<td>5.0-6.5</td>
<td>22</td>
<td>9</td>
<td>29.0</td>
<td>9.3</td>
<td>SC</td>
<td>Tan CLAYEY SAND w/Calcereous Particles</td>
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<tr>
<td>B-1</td>
<td>9.0-10.5</td>
<td>NP*</td>
<td>NP*</td>
<td>30.8</td>
<td>12.5</td>
<td>SM</td>
<td>Tan CALICHE</td>
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<td>B-3</td>
<td>2.5-4.0</td>
<td>23</td>
<td>10</td>
<td>37.9</td>
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<td>SC</td>
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<td>9.0-10.5</td>
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<td>B-4</td>
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<td>12</td>
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<td>B-5</td>
<td>0-1.5</td>
<td>26</td>
<td>11</td>
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</tbody>
</table>

*Non-plastic

---

**TEST RESULTS**

Project No. 7320512

New Exhibition Hall
Midland County Horseshoe Complex, Midland, Texas

**PLATE II**
KEY TO LOG OF BORING

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>FEET</th>
<th>SYMBOL</th>
<th>SAMPLE</th>
<th>TEST</th>
<th>MATERIAL DESCRIPTION</th>
<th>UDW (pcf)</th>
<th>UC (tsf)</th>
<th>MC</th>
<th>LL</th>
<th>PI</th>
<th>2% SOIL CLASS</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4.5</td>
<td></td>
<td>18</td>
<td></td>
<td></td>
<td>Push Tube Sample and Pocket Penetrometer Result</td>
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<td></td>
<td>Standard Penetration Test Sample and &quot;N&quot; Value</td>
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<tr>
<td>5</td>
<td></td>
<td></td>
<td>C-5.0</td>
<td>R-4.5</td>
<td>Cuttings Sample</td>
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<td>Core Sample</td>
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SYMBOLES

LEAN CLAY (CL) SAND (SP) CALICHE
FAT CLAY (CH) GRAVEL (GP) LIMESTONE
CLAYEY SAND (SC) SILT (ML) SANDSTONE
SILTY SAND (SM) ELASTIC SILT (MH) SHALE

Groundwater Note: The boring was advanced to a depth of ____ feet below the ground surface without using drilling fluid and groundwater was not encountered above that depth.

LOG OF BORING

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<thead>
<tr>
<th>Project No.</th>
<th>Date:</th>
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**Groundwater Note:** The boring was advanced to a depth of 20.0 feet below the ground surface without using drilling fluid and groundwater was not encountered above that depth.

### LOG OF BORING

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<th>Project No. 7320512</th>
<th>Date: 05-13-2012</th>
<th>Type: Auger</th>
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<td>Depth (Ft)</td>
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<td>Test</td>
<td>Material Description</td>
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<td>Pavement Section (5.0&quot; HMAC; 5.0&quot; Milling)</td>
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<td>Reddish Brown CLAYEY SAND</td>
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<td>Total Depth of Boring = 20.0 Feet</td>
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Groundwater Note: The boring was advanced to a depth of 20.0 feet below the ground surface without using drilling fluid and groundwater was not encountered above that depth.

LOG OF BORING

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Total Depth of Boring = 20.0 Feet

Groundwater Note: The boring was advanced to a depth of 20.0 feet below the ground surface without using drilling fluid and groundwater was not encountered above that depth.

### LOG OF BORING

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<th>Project No.</th>
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Groundwater Note: The boring was advanced to a depth of 20.0 feet below the ground surface without using drilling fluid and groundwater was not encountered above that depth.

**LOG OF BORING**

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<th>UDWpcf</th>
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**Total Depth of Boring = 20.0 Feet**

**Groundwater Note:** The boring was advanced to a depth of 20.0 feet below the ground surface without using drilling fluid and groundwater was not encountered above that depth.

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<td></td>
<td>Midland County, Midland, Texas</td>
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</tbody>
</table>
Dear Ms. Engeldahl:

The undersigned, having carefully examined the project manual, drawings, and related documents dated December 14, 2015 and entitled:

Dirtwork
Midland County Amphitheater
2514 Arena Trail
Midland, Texas 79701

All as prepared by Dunaway Associates, having made an on-site inspection of the premises and all other conditions affecting the cost and/or execution of the work, proposes to furnish all materials, labor, and equipment necessary to complete the work in accordance with said documents, of which this proposal is a part, for the following sum:

NOTE: PLEASE MARK “ADD” OR “DEDUCT” ON ALL ALTERNATES.

A. BASE PROPOSAL, Lump Sum: ________________________________
   ________________________________ Dollars ($______)

B. ALTERNATE NO. 1 – (PERFORMANCE AND PAYMENT BOND AS INDICATED FOR BASE BID.)
   For a Lump Sum: ________________________________
   ________________________________ Dollars ($______)
   Add/Deduct
   (Circle One)

Note: All amounts shall be shown in both written and figure form. In case of discrepancy between the written amount and the figure, the written amount will govern.
The undersigned acknowledges receipt of addenda to the Proposal Documents as follows:

<table>
<thead>
<tr>
<th>No.</th>
<th>Date</th>
<th>No.</th>
<th>Date</th>
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</table>

(The Proposer is to fill in I.D. Number and date of each thereby acknowledging receipt of addenda). If awarded the contract, the undersigned agrees to commence Work under this contract on or before a date to be specified in a written Notice to Proceed and to bring the project to Substantial Completion within ________ calendar days (fill in number of days) from the Notice to Proceed, however in no case later than March 4, 2016 from notice to proceed.

We agree to hold our proposal open beyond the Proposal Date for thirty (30) days.

If notified of the acceptance of this proposal within five (5) days of the time set for the opening of proposals, proposer agrees within ten (10) days of notification, to execute a contract on AIA Document A101, Standard Form of Agreement Between Owner and Contractor for the above work, for the agreed upon compensation.

PROPOSAL SECURITY, as defined in the Instructions to Proposers, which the Undersigned agrees to disposition of, as stated in Instructions to Proposers, is attached to this Proposal.

Upon acceptance of the Proposal by Owner and acceptance of Alternate No. 1, contractor shall furnish, at the time of the signing of the Contract, a PERFORMANCE BOND AND LABOR/MATERIAL PAYMENT BOND, in the amount of 100% of the Contract Price and proof of insurance. Surety shall meet requirements specified in Supplementary General Conditions.

I further agree as follows:

1. To submit, along with this proposal form, the following selection criteria information:
   - The number of calendar days required for substantial completion.
   - Resume and references of office project manager and superintendent.
   - Experience record.
   - List of proposed subcontractors (delivered to Midland County within 24 hours of proposed opening).

2. To submit (if required by the Architect) Insurance claims and litigation during last three years.

Selection of the Contractor shall be based on the price, proposed time and the bidder who provides goods or services at the best value for Midland County.

It is understood that the Owner reserves the right to accept or reject any and all Proposals and to waive all formalities in accordance with State law.
IMPORTANT NOTICE:

If Proposer is a Corporation, set forth the legal name of the Corporation, State of incorporation together with the signature of the officer or officers authorized to sign contracts on behalf of the corporation.

If Proposer is a Partnership, set forth the name of the firm together with the signature of the partner or partners authorized to sign contracts on behalf of the partnership.

The undersigned affirms that they are duly authorized to execute this proposal, that this company, corporation, firm, partnership or individual has not prepared this proposal in collusion with any other proposer, and that the contents of this proposal as to prices, terms or conditions of said proposal have not been communicated by the undersigned, not by any employee or agent to any other person engaged in this type of business prior to the official opening of this proposal.

Respectfully Submitted,

By: __________________________________________
   (Authorized Signature)

Title: __________________________________________

Date: __________________________________________

Business Name, Mailing Address or P.O. Box and Zip Code (SEAL: If Proposer is by Corporation)

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

Business Name, Mailing Address or P.O. Box and Zip Code

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

______________________________________________________________________________

Telephone Number with Area Code __________________________

FAX Number with Area Code __________________________

Fill in the applicable information:

A Corporation, chartered in the State of ________________________________, authorized to do business in the State of Texas.

A Partnership, composed of ________________________________________ and ________________________________________

An Individual operating under the name of ________________________________

Corporate Seal:

END OF DOCUMENT 00 42 00

Midland County Amphitheatre 00 42 00-3 Proposal Form
VG A 01515
SECTION 01 11 00
SUMMARY OF WORK

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings, General Conditions of the Contract for Construction, Supplementary Conditions and Division 1 - General Requirements apply to Work of this section.

1.02 SECTION INCLUDES

A. Project; Work covered by Contract Documents.
B. Work under other contracts.
C. Work by Owner.
D. Owner supplied products.
E. Contractor use of site and premises.
F. Work Sequence.
G. Owner occupany.

1.03 PROJECT: WORK COVERED BY CONTRACT DOCUMENTS

A. Without force or effect, Work of the total Project is generally described as follows:
   1. The Work comprises site work at 2514 Arena Trail, for the formation of an Earthen Mound to be used as an amphitheater. The total project consists of Work as shown on the drawings and described in the specifications.

1.04 WORK UNDER OTHER CONTRACTS

There are no other separate contracts.

1.05 WORK BY OWNER

Items noted “NIC” (Not in Contract), or "Owner furnish/Owner installed" (OF/OI) will be furnished and installed by Owner during the construction period of this contract.

1.06 OWNER SUPPLIED PRODUCTS

A. Owner’s Responsibilities:
   1. Provide approximately 22,000 tight cubic yards of ill from existing site.
   2. Water for construction.
   3. Electrical power available from existing building.
B. Contractor’s Responsibilities:
   1. Relocate, compact and shape fill to construction documents.

1.07 CONTRACTOR USE OF SITE AND PREMISES

A. Limit use of site and premises to allow:
   1. Owner occupancy.
   2. Work by Others and Work by Owner.
   3. Use of site and adjacent premises by public for scheduled activities.

B. Construction Operations: Limited to areas indicated on drawings.

1.08 WORK SEQUENCE

A. The documents include an Add Alternate No. 1 Performance and Payment Bonds. Should the Owner elect to accept this alternate, the Owner desires this to be obtained first and in advance of completion of base proposal work.

B. Coordinate construction schedule and Owner’s operations with Owner.

C. Work Schedule
   
<table>
<thead>
<tr>
<th>TASK</th>
<th>TIMELINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Issue drawings to contractor beginning</td>
<td>December 14, 2015</td>
</tr>
<tr>
<td>2. Pre-proposal conference with contractors</td>
<td>Thursday, December 17, 2015, 11 a.m.</td>
</tr>
<tr>
<td>3. Questions received no later than</td>
<td>Friday, December 18, 2015, 5 p.m.</td>
</tr>
<tr>
<td>4. Proposals opened and read</td>
<td>Tuesday, January 5, 2016, 2 p.m.</td>
</tr>
<tr>
<td>5. Proposal reviewed by administration</td>
<td>January 5-8, 2016</td>
</tr>
<tr>
<td>6. Commissioner’s Court review</td>
<td>January 11, 2016</td>
</tr>
<tr>
<td>7. Construction start</td>
<td>January 12, 2016</td>
</tr>
<tr>
<td>8. Construction Complete</td>
<td>March 6, 2016</td>
</tr>
</tbody>
</table>

1.09 OWNER OCCUPANCY

A. The Owner will occupy the existing building during entire period of construction for the conduction of normal operations.

B. Cooperate with Owner to minimize conflict, and to facilitate Owner’s operations.

C. Schedule the Work to accommodate these requirements.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

END OF SECTION 01 11 00
SECTION 01 21 00
ALLOWANCES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS
A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division - 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES
A. Administrative and procedural requirements governing handling and processing allowances.
B. Types of allowances.

1.03 RELATED SECTIONS
A. Section 01 45 29 - Testing Laboratory Services.

1.04 CONDITIONS OF ALLOWANCES
A. Contractor’s costs for products, delivery, installation, labor, insurance, payroll, taxes, and equipment rental will be included in Construction Change Requests authorizing expenditure of funds from Allowances.
B. All work done within the Contingency Allowance shall not be marked up with additional overhead and profit margins. Overhead and profit shall be included in the Base Project Sum.
C. Any additional Work requested by Owner by Change Order beyond the established Contingency Allowance sum shall have an established amount of 10% of the labor and material costs to cover the costs of overhead, insurance, bonds and 5% profit.
D. Funds will be drawn from Allowances only by approved and signed Construction Change Requests.
E. At closeout of Contract, funds remaining in Allowances will be credited to Owner by Change Order.

PART 2 – PRODUCTS
Not Used.

PART 3 – EXECUTION

3.01 PREPARATION
A. Coordinate materials or services and their installation for each allowance with related
materials and installations to ensure that each allowance item is completely integrated and interfaced with related construction activities.

3.02 SCHEDULE OF ALLOWANCES

A. Allowance No. 1 – Contingency: Include a contingency allowance for use upon the Owner’s instructions:

1. Allowance No. 1: $15,000.00

END OF SECTION 01 21 00
SECTION 01 23 00

ALTERNATES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary
   Conditions and other Division - 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. This Section specifies administrative and procedural requirements for Alternates.

1.03 RELATED SECTIONS

A. Section 01 33 00 - Submittal Procedures.
B. Section 01 60 00 – Product Requirements

1.04 DEFINITIONS

A. Alternate: An Alternate is an amount proposed by Bidders and stated on the Bid Form for
certain construction activities defined in the Bidding Requirements that may be added to
or deducted from Base Bid amount if the Owner decides to accept a corresponding
change in either the amount of construction to be completed, or in the products,
materials, equipment, systems or installation methods described in Contract Documents.

B. Coordination: Coordinate related Work and modify or adjust adjacent Work as necessary
to ensure that Work affected by each accepted Alternate is complete and fully integrated
into the project.

C. Notification: Immediately following the award of the Contract, the Architect will prepare
and distribute to each party involved, notification of the status of each Alternate. Indicate
whether Alternates have been accepted, rejected or deferred for consideration at a later
date.

D. Schedule: A "Schedule of Alternates" is included at the end of this Section.
   1. Include as part of each Alternate, miscellaneous devices, accessory objects and
      similar items incidental to or required for a complete installation whether or not
      mentioned as part of the Alternate.

PART 2 – PRODUCTS

Not Used
PART 3 – EXECUTION

3.01 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Add Performance and Payment Bonds

END OF SECTION 01 23 00
SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings, General Conditions of the Contract for Construction, Supplementary Conditions and Division 1 - General Requirements apply to Work of this section.

B. Drawings, Standard General Conditions of the Construction Contract, Supplementary Conditions and Division 1 - General Requirements apply to Work of this section.

C. Drawings, Construction Contract Clauses, Supplementary Conditions and Division 1 - General Requirements apply to Work of this section.

1.02 SECTION INCLUDES

A. Coordination.

B. Electronic files.

C. Material Safety Data Sheets (MSDS)

D. Preconstruction meeting.

E. Request for information.

F. Site mobilization meeting.

G. Progress meetings.

H. Pre-installation meetings.

I. Cutting and patching.

1.03 COORDINATION

A. Coordinate scheduling, submittals, and Work of the various sections of the Project Manual to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Verify that utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate Work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate completion and clean up of Work of separate sections in preparation for Substantial Completion.

D. After Owner occupancy of premises, coordinate access to site for correction of defective
Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.04 ELECTRONIC FILES

A. Electronic drawing files are available from the Architect upon request. Only the Contractor or his subcontractors and sub-subcontractors may request an electronic file. An electronic file will be provided in Revit/AutoCAD format of the release currently used by the Architect. File will be provided on transfer by means of Architect’s transfer protocol.

B. Prior to delivery of the file, requestor shall sign an Electronic File Transfer Release Form provided by the Architect (sample of form included in this section).

C. Electronic file shall be used only for the production of information required by this project and shall not be used in any other form (in whole or part).

1.05 PRECONSTRUCTION MEETING

A. Architect will schedule a meeting after Notice to Proceed.

B. Attendance Required: Owner, Architect, Engineer, Contractor and major Subcontractors.

C. Agenda:
   1. Confirm submission of executed bonds and insurance certificates with contract if required.
   2. Distribution of Contract Documents (if not previously distributed).
   3. Submission of list of Subcontractors, list of products, Schedule of Values, and progress schedule (if not previously submitted).
   5. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders and Contract closeout procedures.
      a. Use of premises by Owner and Contractor.
      b. Owner's requirements.
      c. Construction facilities and controls provided by Owner.
      d. Temporary utilities provided by Owner.
      e. Survey and building layout.
      f. Security and housekeeping procedures.
      g. Schedules.
      h. Procedures for testing.
      i. Procedures for maintaining record documents.
      j. Requirements for start-up of equipment.
      k. Inspection and acceptance of equipment put into service during construction period.

D. Record minutes and distribute copies within three days after meeting to participants with two copies to Architect and those affected by decisions made.
1.06 REQUEST FOR INTERPRETATION

A. Contractor shall use Architect’s standard form when submitting Requests For Interpretation (RFI). Architect will issue a copy of this form to Contractor in both hard copy and electronic media. Only Contractor can submit RFIs to Architect. RFI requests from subcontractors or material suppliers will not be considered.

B. All information indicated on the form to be provided by Contractor shall be complete before a request can be submitted to the Architect’s office. Requests with incomplete information will be returned to the Contractor. Submission of a complete RFI request by Contractor does not constitute an RFI until Architect makes the determination. If Architect determines that request can not be answered with the information provided in the Contract Documents, Architect will then assign an RFI tracking number. Requests determined by Architect not to be an RFI will be returned to Contractor without being assigned an RFI tracking number. A transmittal document returning the denied RFI request will be provided with a response indicating action to be taken by Contractor.

C. If request and proposed solution cannot fit on the form, an attachment may be identified in the Request or Contractor Proposed Solution areas, then attached to the form and submitted to Architect. RFIs may contain more than one item when the items are related issues. Otherwise, only one item shall be addressed on each RFI request.

D. Architect’s response to the RFI will be in writing on the same form, or by attachment and issued to Contractor and Owner.

E. Responses from Architect will not change any requirement of the Contract Documents. Should Contractor believe an RFI response to cause a change to the Contract, Contractor shall give written notice to Architect in accordance with the requirements in the Contract. Written notice shall include specific reasons and an order of magnitude of Cost and/or Time that Contractor deems appropriate based on the Architect’s RFI response. Contractor’s written notice does not constitute a Change Order, but provide a basis for further review and discussion with the Architect.

1.07 SITE MOBILIZATION MEETING

A. Architect will schedule a meeting at the Project site prior to Contractor occupancy.

B. Attendance Required: Architect, Special Consultants, Contractor, Contractor's Superintendent, and major Subcontractors.

C. Agenda:
   1. Use of premises by Owner and Contractor.
   2. Owner's requirements.
   3. Construction facilities and controls provided by Owner.
   4. Temporary utilities provided by Owner.
   5. Security and housekeeping procedures.
   7. Procedures for testing.
   8. Procedures for maintaining record documents.
   9. Requirements for start-up of equipment.
   10. Inspection and acceptance of equipment put into service during construction
D. Record minutes and distribute copies within three days after meeting to participants with three copies to Architect and those affected by decisions made.

1.08 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at minimum of once a week. At times of decreased activity progress meetings may be scheduled every week.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Architect as appropriate to agenda topics for each meeting.

D. Agenda:
   1. Review minutes of previous meetings.
   2. Review of Work progress.
   3. Field observations, problems, and decisions.
   4. Identification of problems which impede planned progress.
   5. Review of submittals schedule and status of submittals.
   6. Review of off-site fabrication and delivery schedules.
   7. Maintenance of progress schedule.
   8. Corrective measures to regain projected schedules.
   9. Planned progress during succeeding Work period.
  10. Coordination of projected progress.
  12. Effect of proposed changes on progress schedule and coordination.
  13. Other business relating to Work.

E. Record minutes, and distribute copies within three days to Architect, participants, and those affected by decisions made.

PART 2 - PRODUCTS

Not Applicable.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Examine and verify specific conditions described in individual specification sections.

C. Verify that utility services are available, of the correct characteristics, and in the correct location.
3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.
B. Seal cracks or openings of substrate prior to applying next material or substance.
C. Apply any manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 ATTACHMENTS

A. Request for Information Form.
B. Electronic Data Transfer Form

END OF SECTION 01 30 00
REQUEST FOR INTERPRETATION

Date: ____________________________ RFI#: _________________________________

To: Vandergriff Group Architects From: _________________________________
Midland, Texas Address: _________________________________

Project: Midland County Amphitheatre Phone: _________________________________
Midland, Texas

VGA Project #: 01515 Fax: _________________________________

*Items to be completed by Contractor before submittal to architect review.
* Specification Section/Paragraph No.: ___________ * Drawing Reference/Detail No.________

- Request:

- Contractor Proposed Solution

- Signed by: * Response needed in _____ Days

Sent to: Response:

☐ Attachments:

Response From: To: Date Rec’d: Date Ret’d:

Signed by:

Copies: ☐ Owner ☐ Consultants ☐ _________________ ☐ _________________
Hold Harmless and Indemnification Agreement for Electronic File(s) ____________________

In consideration of Vandergriff Group providing certain electronic media to the recipient, the recipient covenants and agrees to be bound by the following:

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Name: ___________________________________________ e-mail address: _____________________

Signed:___________________________________________   Date:_____________________ _________

The above person is duly authorized to sign on the behalf of ____________________________________

Company Name

VGA@ VANDERGRIFF-GROUP.COM
SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.01 DESCRIPTION

A. This Section specifies administrative and procedural requirements for handling and processing Shop Drawings, Product Data, Samples, Project Information and Contract Closeout Information submittals.

B. Provisions of this Section take precedence over provisions in General Conditions of the Contract for Construction governing Shop Drawings, Product Data, Samples, Project Information and Contract Closeout Information Submittals.

C. Submittals are not to be used as means for substitution requests.

D. Submittals that include substitutions will be returned without review or action.

E. Contact Architect in event of non-availability of specified product due to strikes, lockouts, bankruptcy, production discontinuance, proven shortage, or similar occurrences.

F. Notify Architect, in writing, with substantiating data as soon as non-availability becomes apparent.

G. Notify in time to avoid delay in construction.

H. Appropriateness and accuracy of calculations is responsibility of Contractor, and Contractor’s Professional Structural Engineer when such calculations are required to be professionally sealed.

I. When professional or other certification of performance criteria of materials, systems or equipment is required by Contract Documents, Architect shall be entitled to rely upon accuracy and completeness of such calculations and certifications.

1.02 DEFINITIONS

A. General:  
1. Submittals are NOT Contract Documents.
2. Purpose of submittal is to demonstrate for those portions of Work, for which submittals are required by Contract Documents, the way Contractor proposed to conform to information given and design concept expressed in Contract Documents.

B. “Architect”: The term Architect shall mean Civil Engineer for this portion of the project.

C. “Contractor”: The term Contractor shall mean Construction Manager and Contractor(s) when used in this section.

D. “Shop Drawing” Action Submittals:
1. Drawings to scale, diagrams, schedules and other data specially prepared for Work by Contractor or a Subcontractor, sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of Work.

E. “Product Data” Action Submittals:
   1. Illustrations, standard schedules, performance charts, instructions, brochures, color charts, performance curves, diagrams, test data and other information furnished by Contractor to illustrate material, product, equipment or system for some portion of Work.

F. “Sample Action” Submittals:
   1. Physical examples which illustrate size, kind, pattern, texture, materials, equipment, systems or Workmanship and establish standards by which Work will be judged.
   2. Samples also include job site Mock-ups and sample construction.

G. “Project Information” Submittals:
   1. Items pertaining to quality control and Owner information which do not require review or response by Architect and are to be retained for project file only.
   2. Examples include but are not limited to:
      4. Certifications.
      5. Design calculations.
      6. Coordination drawings.
      7. Architect may review at its sole discretion, for general compliance with Contract Documents only.
      8. Review will not constitute a detailed check of submitted design calculations.

1.03 SUBMITTALS (Required BY this section)

A. Project information:

1.04 SCHEDULE OF SUBMITTALS

A. Complete Schedule of Submittals shall include Shop Drawings, Product Data, Samples, Project Information, and Contract Closeout Information required by specification section Submittal paragraphs.
   1. Contractor or Subcontractors may require submittals for their coordination purposes even when submittals are not required by Contract Documents for Architect’s review. Do not include or submit such submittals to Architect.
   2. Do not include or submit MSDS information.
   3. Do not include or submit items not required to be submitted by Contract Documents.
   4. Indicate proposed submittal dates for each submittal.
   5. Arrange submittals by specification section:
      a. Submittals shall include items from one specification section only.
      b. Submit Shop Drawings, Product Data, and Project Information (except for Field Test Reports) items specified in a section at same time for a complete review.
         1) Shop Drawings: Individual submittal item. Subparagraphs represent description of items to include.
a) Indicate additional submittals that will be generated as result of dividing required submittal by building, floor, area of a floor, or other subdivision.

1) Product Data: Individual submittal item. Subparagraphs represent description of items to include as part of single submittal.

2) Sample and Information submittals: Each subparagraph represents an individual submittal item.

6. Indicate submittals that will be provided to agencies having jurisdiction. Schedule sufficiently in advance of date required to allow agency reasonable time for review, and Contractor resubmission if necessary, and to cause no delay in Work or in activities of Owner or other contractors.

7. Schedule submittals sufficiently in advance of date required to allow Architect reasonable time for review, and Contractor’s resubmission if necessary, and to cause no delay in Work or in activities of Owner or other contractors.

8. Allow at least two weeks for Architect’s review and processing of each submittal, excluding mailing.

9. Do not submit large quantities of submittals at one time.

10. Schedule Contract Closeout Information submittals during last quarter of construction period and prior to Substantial Completion. See specific specification sections for requirements.

B. Partial payment requests may be withheld until satisfactory Schedule of Submittals has been received.

1.05 SHOP DRAWINGS

A. Shop Drawing Action Submittals are required as called for in each specification section Submittal paragraph.

1. Do not use Contract Drawings as Shop Drawings.

B. Unless otherwise agreed to by Architect, submit .pdf’s via email to the architect.

1. Blue lines, sepias or third generation prints or faxes are not acceptable.

2. Additional copies may be required by other entities, but Architect will not accept or return.

3. Drawings shall be 610 x 915 mm 24 x 36 IN or not larger than 760 x 1065 mm 30 x 42 IN.

4. Allow clear space, approximately 25,806 mm² 40 SQ IN, for approval stamps on right hand side of document.

5. Provide title block indicating; Project name, Project number, drawing number, and name of entity preparing submittal.

1.06 PRODUCT DATA

A. Product Data Action Submittals are required as called for in each specification section Submittal paragraph.

B. Unless otherwise agreed to by Architect, submit .pdf’s via email, unless quantity is indicated elsewhere that are suitable for reproduction of Product Data items such as
equipment brochures, product catalog cuts of fixtures, standard catalog items, etc.
1. Faxes or third generation copies are not acceptable.
2. Additional copies may be required by other entities; however, Architect may not return them.
3. Include index if multiple items under specification section are included in submittal.
4. Mark each copy to show exact item, model, and options submitted for review.
5. Include scale details, sizes, dimensions, performance characteristics, capacities, wiring diagrams, controls and other pertinent data.
6. Data shall be 215 x 280 mm or 215 x 355 mm 8-1/2 x 11 IN or 8-1/2 x 14 IN maximum.

1.07 SAMPLES

A. Sample Action Submittals are required in applicable specification section Submittal paragraph.
   1. Identify samples with manufacturer’s name, item, use, type, Project designation, specification section or drawing detail reference, color, range, texture, finish and other pertinent data.
   2. Submit samples to address indicated, or Project site if required or requested.
   3. Samples shall have a label affixed or attached thereto of sufficient size to accommodate Contractor’s and Architect’s approval stamp.
   4. Architect may retain samples for comparison purposes.

1.08 PROJECT INFORMATION AND CONTRACT CLOSEOUT INFORMATION

A. Project Information and Contract Closeout Information submittals are required as called for by specification section Submittal paragraph.

B. Unless otherwise agreed to by Architect, submit to Architect’s for records one (1) original, or high quality high contrast copy of submittal suitable for reproduction, unless quantity is indicated elsewhere, submittal. Submit quantity indicated in specifications sections to Owner.
   1. Architect is not required to return submittal.
   2. Include pertinent data.
   3. Information shall be 215 x 280 mm or 215 x 355 mm 8-1/2 x 11 IN or 8-1/2 x 14 IN maximum.
   4. Do not fold. Submit in envelope large enough for submitted items.

1.09 TRANSMITTAL – GENERAL

A. Contractor is responsible for making submissions.
   1. Submit items to Contractor for transmittal to office of the Architect: Dunaway Associates

B. Transmit items with Submittal Transmittal form included at end of this section, or supplied by Architect, or of a similar format approved in advance by Architect.
   1. If submittal is based on an "Optional" manufacturer listed in Part 2 of technical specification sections, instead of "Base" manufacturer listed, then submit completed form titled "Optional Product/System Comparison" included at end of this section along with Submittal Transmittal form.
a. Optional Product/System Comparison" form is not required to be submitted if "Optional" manufacturer product name, product number or model number or both are specifically listed in technical specification sections.

2. Contact Architect for copy made for Project.

3. Indicate Project name, Architect's project number, specification section title, description of submitted items or systems, manufacturer and submittal type on transmittal form.

4. Indicate submitted date, approval and sign in appropriate space on transmittal form.

5. Submittal Transmittal form shall stay with submittal throughout its routing.
   a. Make copy for file if necessary.

6. Indicate submittal number in space provided on Submittal Transmittal form. Following submittal numbering system shall be used:
   a. Identify each submittal using applicable 5 or 6 digit specification section number from Contract Documents.
   b. After section number, indicate sequence number. First submittal of section series would be numbered “#####-1”, next would be “#####-2”, etc.
   c. If returned for re-submission, add a designation character. Second submission would be “#####-1A”, third would be “#####-1B”, etc.

C. Submit submittals required by Contract Documents according to approved Schedule of Submittals.

D. Submittals shall only include items from one specification section.
   1. Project Information Submittals and Contract Closeout Information Submittals shall be submitted separately from other submittals required by specification section.
   2. Submit all items specified in section at same time for complete review, except Contract Closeout Information Submittals.

E. Do not submit following:
   1. Submittals not required by specification section Submittal paragraph.
   2. Submittals required by other contractors or trades for their coordination that are not required by specification section Submittal paragraph.
   3. Submittal of products, systems or manufactures not specified.
   4. Submittal of substitution.
   5. Submittal of MSDS information.
   6. Information on only a portion of a submittal.
   7. Large quantities of submittals at one time.

F. Do not mark copies with highlighters that black out information, or turn opaque when reproduced, or will not scan or reproduce legibly.

1.10 CONTRACTOR AND SUBCONTRACTOR ACTION

A. Direct specific attention in writing with submittal or on submittal, indicating deviations from requirements of Contract Documents.
   1. Contractor shall not be relieved of responsibility for any deviation from requirements of Contract Documents by Architect's approval of submittals unless, (1) Contractor has informed Architect in writing of such deviation at time of submission, and (2) Architect has given written approval to specific deviation...
as a minor change in Work, or (3) a Change Order or Construction Change Directive has authorized the deviation.

2. Completed Work shall match appearance of approved samples and mock-ups.

B. Contractor represents and warrants that submittals shall be prepared by persons and entities possessing expertise and experience in the trade for which submittal is prepared, and if required by Architect or applicable law, by a licensed Professional Engineer or Structural Engineer (or other specialized Engineer) where so stipulated.

C. Contractor is responsible for confirmation and correlation of dimensions at Project site; for information that pertains solely to fabrication processes or to techniques of construction; and for coordination of Work of trades.

D. Contractor and Subcontractor shall review submittal required by Contract Documents for compliance with Contract Documents, approve and submit to Architect.

E. Submittal to Architect indicates Contractor, Subcontractor represent they have:
   1. Reviewed submittal for compliance with the Contract Documents;
   2. Determined and verified field measurements, and field construction criteria related thereto, or will do so;
   3. Determined and verified quantities, materials, performance criteria, installation requirements, catalog numbers and similar data related thereto;
   4. Determined substitutions have not been included;
   5. Checked, determined, verified and coordinated information contained within such submittals with requirements of Work, Contract Documents and other submittals;
   6. Certified that submittal is in compliance with Contract Documents, and have approved the submittal.

F. Resubmit items returned by Architect and marked “Revise and Resubmit” or “Not Approved” until approval is received.
   1. Direct specific attention, in writing, or on resubmitted submittals to revisions other than those requested by Architect on previous submittals.
   2. Bubble or otherwise clearly identify all changes from previous submittal.
   3. Tag each re-submittal with a designation that reuses the previous submittal number and a suffix designating the re-submittal sequence in accordance with the numbering system indicated in this section.

G. Contractor shall reproduce and distribute copies of submittals after Architect’s review to:
   1. Project site: Copy of “approved” or “approved as noted” submittals for use by Contractor’s field staff and Architect’s representatives.
   2. Subcontractor/vendor.
   3. Other Contractors, Subcontractors or vendors as may be required for coordination purposes.
   4. Owner: Copy of “approved” or “approved as noted” submittals.
   5. Authorities having jurisdiction: Copy of “approved” or “approved as noted” submittals if required by Authority Having Jurisdiction (AHJ).
   6. Inspector (if any): Copy of “approved” or “approved as noted” submittals.

H. Contractor shall not be relieved from responsibility for coordination with other submittals or for errors or omissions in submittals by Architect’s approval thereof.
I. Material lists and quantity information included in submittals are sole responsibility of Contractor.

J. Where a submittal is required by Specifications, any related Work performed prior to Architect’s review and approval of the pertinent submission will be sole expense and responsibility of Contractor.

1.11 ARCHITECT ACTION on SUBMITTALS: SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

A. Architect will review and approve or take other appropriate action upon Contractor’s submittals, but only for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
   1. Such review and action is limited to only those submittals identified in Contract Documents.
   2. Architect’s review of such submittals is not conducted for purpose of determining accuracy and completeness of other details such as dimensions, quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain responsibility of the Contractor.
   3. Architect’s review or approval of a specific item shall not indicate approval of an assembly of which the item is a component.
   4. Architect’s review or approval shall not constitute a review of safety or health precautions, or of any construction means, methods, techniques, sequences or procedures.
   5. Architect’s approval of a resubmission shall not apply to revisions that Contractor has not directed specific attention to in writing on resubmitted submittals, other than those requested by Architect on previous submittal.

B. Architect’s action will be taken with such reasonable promptness as to cause no delay in Work or in activities of Owner, Contractor or separate contractors, while allowing sufficient time in Architect’s professional judgment to permit adequate review by Architect, Architect’s consultants, and Owner, if needed.
   1. Architect’s obligation to review or approve submittals and to return them with reasonable promptness is conditional upon prior review and approval of submittals by Contractor, and Contractor’s transmittal of submittals in accordance with Contract Documents and approved Schedule of Submittals.

C. Items not submitted in accordance with provisions of this section may be returned, without review or action.
   1. Submittals which do not indicate Contractor has reviewed submittal for compliance with Contract Documents, and approved submittal.
   2. Submittals which are not required by Contract Documents.
   3. Submittal on items not approved for use by Contract Documents.
   4. Submittals which include information from more than one specification section.
   5. Project Information Submittals or Contract Closeout Information Submittals included with other submittals required by specification section Submittal paragraph.
   6. Submittals required by other contractors or trades for their coordination that are not required by specification section Submittal paragraph.
   7. Submittal of products, systems, or manufactures not specified.
   8. Submittal of substitution.
10. Information on only a portion of a submittal.
11. If approved Submittal Transmittal form was not used.

D. If a submittal must be delayed for coordination with other submittals not yet submitted, Architect may, as an option, either return submittal with no action or notify Contractor of other submittals which must be received before submittal will be reviewed.

E. Additional copies of submittals not required or requested may not be returned.

F. Architect may review Project Information Submittals or Contract Closeout Information Submittals at its sole discretion, for general compliance with design concept expressed in Contract Documents.

G. Architect will post reviewed submittal and shop drawing information indicating comments and action taken for the Contractor’s use and distribution on HDR’s FTP (File Transfer Protocol) website. Additional information will be provided at the pre-construction conference in regard to accessing the website and reviewed submittal information.

1. Architect is not required to return Project Information and Contract Closeout Information submittals.

1.12 ATTACHMENTS

A. Submittal Transmittal

B. Option Product/Systems Comparison

END OF SECTION 01 33 00
## Midland County Amphitheatre

### SUBMITTAL TRANSMITTAL

**PROJECT:** Midland County Amphitheatre  
**ARCH PROJ. NO.:** 01515

**SPECIFICATION TITLE:**

**MANUFACTURER:**

- **“Base” Manufacturer**  
- **“Optional” Manufacturer** *(Do not submit on manufacturers not listed in specifications)*  

(Complete attached Optional Product/System Comparison form if manufacturer is an “Optional” manufacturer)

**DESCRIPTION OF SUBMITTED ITEM:**

**TYPE:**  
- Shop Drawing  
- Product Data  
- Sample  
- Project Information  
- Project Closeout

**NOTE 1:** Submittal transmittal to Architect indicates Contractor, and subcontractor has reviewed for compliance with Contract Documents and has approved submittal.

**NOTE 2:** THIS TRANSMITTAL FORM SHALL STAY WITH SUBMITTAL THROUGHOUT ROUTING. COPY FOR FILE.

<table>
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<th>ACTION TAKEN BY</th>
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<th>DATE SENT</th>
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**ACTION LEGEND:** *(Indicate in ACTION TAKEN column above)*  
- A REVIEWED  
- B MAKE CORRECTIONS NOTED  
- X REJECTED  
- R REVISE AND RESUBMIT

**COMMENTS:**  
- SEE ATTACHED COMMENTS  
- SEE ENCLOSED SUBMITTAL FOR COMMENTS  
- SUPPLEMENTAL INFORMATION REQUIRED
OPTIONAL PRODUCT/SYSTEM COMPARISON

IF SUBMITTING ON A MANUFACTURER LISTED AS "OPTIONAL" IN TECHNICAL SPECIFICATIONS, COMPLETE THIS FORM, AND SUBMIT WITH FIRST SUBMITTAL TRANSMITTAL FOR PRODUCT
(Note: Form not required if "Optional" manufacturer product name, product number or model number or both are specifically listed in technical specification sections)

Midland County Amphitheatre

PROJECT: VGA 01515

VGA 01515

SUBMITTAL NO: __ __ __ __ __ - __ __

SECTION NUMBER | | | | | | | | |
SEQUENCE NUMBER | | | | | | | | |
RE-SUBMITTAL CHARACTER | | | | | |

Specification Section No.: ____________________________________________
Article(s)/paragraph(s): ____________________________________________

PRODUCT / SYSTEM COMPARISON:
Provide a one-to-one comparison with ALL specified product(s)

<table>
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<tr>
<th>SPEC DESIGNATION (IF ANY)</th>
<th>BASE MANUFACTURER’S PRODUCT/SYSTEM</th>
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<tr>
<td>Manufacturer:</td>
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<tr>
<td>Name, brand:</td>
<td></td>
<td></td>
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<tr>
<td>Catalog No.:</td>
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<tr>
<td>etc.:</td>
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EFFECT OF PRODUCT:
Optional affects other parts of Work: No ☐ Yes ☐ (If yes, explain below)
Optional requires dimensional revision or redesign of structure or mechanical and electrical Work: No ☐ Yes ☐ (If yes, explain below)
Same warrantee provided as specified base product: No ☐ Yes ☐ (If yes, explain below)

Explanation: ____________________________________________

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Midland County Amphitheatre 01 33 00 – 1 – Attachment B Optional Product/ System Comparison Form
VGA 01515
STATEMENT OF CONFORMANCE OF PRODUCT OR SYSTEM TO CONTRACT REQUIREMENTS:
Supplier, Subcontractor and Contractor in making submittal of Optional manufacturer’s product or system, or in using an Optional manufacturer’s product or system represent:

☐ They will coordinate installation of proposed product or system into Work, to include necessary changes or modifications or both to the Work, including additional costs to other contractors, when such changes result solely from the use of an Optional Manufacturer.

ACKNOWLEDGEMENTS:
FOLLOWING FIRM HEREBY REQUESTS CONSIDERATION OF OPTIONAL PRODUCT OR SYSTEMS:

Requested by (Firm):
Acknowledged by (print & sign): ____________________________ Date: ____________
Position: ____________________________ Phone: ____________________________

Subcontractor:
Acknowledged by (print & sign): ____________________________ Date: ____________
Position: ____________________________ Phone: ____________________________

Contractor:
Acknowledged by (print & sign): ____________________________ Date: ____________
Position: ____________________________ Phone: ____________________________

☐ Recommend approval:

CONSTRUCTION MANAGER’S ACKNOWLEDGMENT AND RECOMMENDATION:
☐ Do not recommend approval for following reasons:
☐ Returned to requester - Need more information:

Comment:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Construction Manager:
Acknowledged by (print & sign): ____________________________ Date: ____________
Position: ____________________________
PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings, General Conditions of the Contract for Construction, Supplementary Conditions and Division 1 - General Requirements apply to Work of this section.

1.02 SECTION INCLUDES

A. Quality assurance.
B. Schedule of references.

1.03 QUALITY ASSURANCE

A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
B. Conform to reference standard by date of issue current on date of Contract Documents.
C. Obtain copies of standards when required by Contract Documents.
D. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding?
E. The contractual relationship duties and responsibilities of the parties in Contract nor those of the Architect shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.04 SCHEDULE OF REFERENCES

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<td>AA</td>
<td>Aluminum Association</td>
<td>900 19th St., NW</td>
<td>(202) 862-5100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Washington, DC 20006</td>
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<td><a href="http://www.aluminum.org">www.aluminum.org</a></td>
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<td>AABC</td>
<td>Associated Air Balance Council</td>
<td>1518 K St., NW</td>
<td>(202) 737-0202</td>
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<td>Washington, DC 20005</td>
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<td><a href="http://www.aabchq.com">www.aabchq.com</a></td>
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<tr>
<td>AAMA</td>
<td>American Architectural Manufacturers Association</td>
<td>1827 Walden Office Sq., Suite 104</td>
<td>(847) 303-5664</td>
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<tr>
<td></td>
<td></td>
<td>Schaumburg, IL 60173-4268</td>
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| AASHTO                            | American Association of State Highway and Transportation Officials  
444 North Capitol St., NW, Suite 249  
Washington, DC 20001  
[www.aashto.org](http://www.aashto.org) | (202) 624-5800  
(800) 231-3475 |
| AATCC                             | American Association of Textile Chemists and Colorists  
P.O. Box 12215  
One Davis Drive  
Research Triangle Park, NC 27709-2215  
[www.aatcc.org](http://www.aatcc.org) | (919) 549-8141 |
| ABMA                              | American Bearing Manufacturers Association  
1200 19th St., NW, Suite 300  
Washington, DC 20036-2422  
[www.abma-dc.org](http://www.abma-dc.org) | (202) 429-5155 |
| ACGIH                             | American Conference of Governmental Industrial Hygienists  
1330 Kemper Meadow Dr. Suite 600  
Cincinnati, Ohio 45240  
[www.acgih.org](http://www.acgih.org) | (513) 742-2020 |
| ACI                               | American Concrete Institute  
P.O. Box 9094  
Farmington Hills, MI 48333  
[www.aci-int.org](http://www.aci-int.org) | (248) 848-3700 |
| ADC                                | Air Diffusion Council  
104 South Michigan Ave., Suite 1500  
Chicago, IL 60603 | (312) 201-0101 |
| ADSC                               | The International Association of Foundation Drilling  
9696 Skillman Street, Suite 280  
Dallas, TX 75243  
[www.adsc-iafd.com](http://www.adsc-iafd.com) | (214) 681-5994 |
| AF&PA                              | American Forest and Paper Association  
1111 19th St., NW, Suite 800  
Washington, DC 20036  
[www.afandpa.org](http://www.afandpa.org) | (202) 463-2700 |
| AGA                                | American Gas Association  
400 N. Capitol St., NW  
Suite 450  
Washington, DC, 20001  
[www.agaa.org](http://www.agaa.org) | (202) 824-7000 |
| AGC                                | Associated General Contractors of America  
333 John Carlyle Street  
Suite 200  
Alexandria, VA 22314  
[www.agc.org](http://www.agc.org) | (703) 548-3118 |
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<td>American Hardboard Association</td>
<td>1210 W. Northwest Hwy Palatine, IL 60067</td>
<td>(847) 934-8800 <a href="http://www.hardboard.org">www.hardboard.org</a></td>
</tr>
<tr>
<td>AI</td>
<td>Asphalt Institute</td>
<td>Research Park Drive P.O. Box 14052 Lexington, KY 40512-4052</td>
<td>(606) 288-4960 <a href="http://www.asphaltinstitute.org">www.asphaltinstitute.org</a></td>
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<td>American Institute of Architects</td>
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<td>AISC</td>
<td>American Institute of Steel Construction</td>
<td>One East Wacker Dr., Suite 3100 Chicago, IL 60601-2001</td>
<td>(312) 670-2400 <a href="http://www.aisc.org">www.aisc.org</a></td>
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<td>AISI</td>
<td>American Iron and Steel Institute</td>
<td>1101 17th St., NW, Suite 1300 Washington, DC 20036</td>
<td>(202) 452-7100 (800) 277-3850 <a href="http://www.steel.org">www.steel.org</a></td>
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<td>AITC</td>
<td>American Institute of Timber Construction</td>
<td>7012 S. Revere Pkwy, Suite 140 Englewood, CO 80112</td>
<td>(303) 792-9559 <a href="http://www.aitc-glulam.org">www.aitc-glulam.org</a></td>
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<td>AMCA</td>
<td>Air Movement and Control Association International, Inc.</td>
<td>30 W. University Dr. Arlington Heights, IL 60004-1893</td>
<td>(847) 394-0150 <a href="http://www.amca.org">www.amca.org</a></td>
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<tr>
<td>ANSI</td>
<td>American National Standards Institute</td>
<td>1819 L. Street, N.W. Washington, DC 20036</td>
<td>(202) 293-8020 <a href="http://wwwansi.org">wwwansi.org</a></td>
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<td>APA/EWA</td>
<td>APA-The Engineered Wood Association</td>
<td>P.O. Box 11700 Tacoma, WA 98411-0700</td>
<td>(253) 565-6600 <a href="http://www.apawood.org">www.apawood.org</a></td>
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<td>API</td>
<td>American Petroleum Institute</td>
<td>1220 L St., NW Washington, DC 20005-4070</td>
<td>(202) 682-8000 <a href="http://wwwapi.org">wwwapi.org</a></td>
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<tr>
<td>AREMA</td>
<td>American Railway Engineering and Maintenance-of-Way Association</td>
<td>8201 Corporate Drive, Suite 1125 Landover, MD 02785-2230</td>
<td>(301) 459-3200 <a href="http://wwwarema.org">wwwarema.org</a></td>
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<td>Architectural Woodwork Institute</td>
<td>1952 Isaac Newton Sq. West</td>
<td>Reston, VA 20190</td>
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<td>American Wood-Preservers’ Association</td>
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<td>Granbury, TX 76049</td>
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<td>550 NW LeJeune Rd.</td>
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<td>6666 W. Quincy Ave.</td>
<td>Denver, CO 80235</td>
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<td>Builders’ Hardware Manufacturer Association</td>
<td>355 Lexington Avenue, 17th floor</td>
<td>New York, NY 10017</td>
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<td>BIA</td>
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<td>The Brick Industry Association</td>
<td>11490 Commerce Park Drive</td>
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<td>CDA</td>
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<td>260 Madison Ave., 16th Floor</td>
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<td>Code of Federal Regulations</td>
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<td>Compressed Gas Association</td>
<td>1725 Jefferson Davis Hwy, Suite 1004</td>
<td>Arlington, VA 22202-4102</td>
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<td>Ceilings and Interior Systems Construction Association</td>
<td>1500 Lincoln Hwy, Suite 202</td>
<td>St. Charles, IL 60174</td>
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<td>CISPI</td>
<td>Cast Iron Soil Pipe Institute</td>
<td>5959 Shallowford Rd., Suite 419</td>
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<td>Washington, DC 20207-0001</td>
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<td>310 S. Holiday Ave., Dalton, GA 30722-2048</td>
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<td>Cedar Shake and Shingle Bureau</td>
<td>P.O. Box 1178, Sumas, WA 98295</td>
<td>(604) 462-8961</td>
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<td>CTI</td>
<td>Cooling Technology Institute</td>
<td>530 Wells Fargo Drive, Suite 218, Houston, TX 77090</td>
<td>(281) 583-4087</td>
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<td>DASMA</td>
<td>Door and Access Systems Manufacturers Association International</td>
<td>1300 Summer Avenue, Cleveland, OH 44115-2851</td>
<td>(216) 241-7333</td>
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<td>DHI</td>
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<td>14150 Newbrook Dr., Suite 200, Chantilly, VA 20151</td>
<td>(703) 222-2010</td>
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<td>DOT</td>
<td>Department of Transportation</td>
<td>400 7th Street, S.W., Washington D.C. 20590</td>
<td>(202) 366-4000</td>
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<tr>
<td>EIMA</td>
<td>EIFS Industry Members Association</td>
<td>3000 Corporate Center Dr., Suite 270, Morrow, GA 30260</td>
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<td>(914) 332-0040</td>
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<td>EPA</td>
<td>Environmental Protection Agency</td>
<td>(800) 490-9198</td>
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<td>P.O. Box 42419</td>
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<td>Cincinnati, Ohio 45242</td>
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<td>FAA</td>
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<td>(202) 366-4000</td>
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<td>800 Independence Ave., SW</td>
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<td>FCC</td>
<td>Federal Communications Commission</td>
<td>(888) 225-5322</td>
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<td>445 12th Street, SW</td>
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<td>FS</td>
<td>Federal Specification Unit</td>
<td>(703) 305-5682</td>
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<td>GA</td>
<td>Gypsum Association</td>
<td>(202) 289-5440</td>
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<tr>
<td></td>
<td>810 First St., NE, Suite 510</td>
<td></td>
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<td></td>
<td>Washington, DC 20002</td>
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GANA  Glass Association of North America  
2945 Southwest Wanamaker Dr., Suite A  
Topeka, KS 66614  
www.glasswebsite.com/gana  
(785) 271-0208

HI  Hydronics Institute  
Division of Gas Appliance Manufacturers Association  
2107 Wilson Blvd., Suite 600  
Arlington, VA 22201  
www.gamanet.org  
(703) 525-7060

HMMA  Hollow Metal Manufacturers Association  
Division of NAAMM  
8 South Michigan Ave., Suite 1000  
Chicago, IL 60603  
www.naamm.org  
(312) 332-0405

HPMA  Hardwood Plywood Manufacturers Association  
HPW  H.P. White Laboratory  
3114 Scarboro Road  
Street, Maryland 21154-1822  
(410) 838-6550

HPVA  Hardwood Plywood and Veneer Association  
P.O. Box 2789  
Reston, VA 20195-0789  
www.hpva.org  
(703) 435-2900

IAS  International Approval Services  
U.S. Operations  
8501 E. Pleasant Valley Rd.  
Cleveland, Ohio 44131-5575  
www.approvals.org  
(216) 524-4990

ICBO  International Conference of Building Officials  
5360 Workman Mill Road  
Whittier, California 90601-2298  
www.icbo.org  
(800) 284-4406

ICC  International Code Council  
5203 Leesburg Pike #708  
Falls Church, VA 22041  
www.intlcode.org  
(703) 931-4533

IEEE  Institute of Electrical and Electronics Engineers  
3 Park Ave., 17th Floor  
New York, NY 10016-5997  
www.ieee.org  
(212) 419-7900

IES  Illuminating Engineering Society of North America  
120 Wall Street, 17th Floor  
New York, NY 10005  
www.iesna.org  
(212) 248-5000
<table>
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<th>Abbreviation</th>
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<tr>
<td>ILI</td>
<td>Indiana Limestone Institute of America</td>
<td>400 Stone City Bank Building, Bedford, IN 47421</td>
<td>(812) 275-4426</td>
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<tr>
<td>IMIAC</td>
<td>International Masonry Industry All-Weather Council</td>
<td>International Masonry Institute, The James Brice House, Annapolis, MD 21401</td>
<td>(410) 280-1305</td>
</tr>
<tr>
<td>IMSA</td>
<td>International Municipal Signal Association</td>
<td>PO BOX 539, 165 East Union Street, Newark, NY 14513-0539</td>
<td>(315) 331-2182</td>
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<tr>
<td>ISWA</td>
<td>Insect Screen Weavers Association</td>
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<tr>
<td>KCMA</td>
<td>Kitchen Cabinet Manufacturers Association</td>
<td>1899 Preston White Dr., Reston, VA 20191-5435</td>
<td>(703) 264-1690</td>
</tr>
<tr>
<td>LPI</td>
<td>Lightning Protection Institute</td>
<td>3335 N. Arlington Heights Rd., Suite E, Arlington Heights, IL 60004</td>
<td>(800) 488-6864 (847) 577-7200</td>
</tr>
<tr>
<td>MBMA</td>
<td>Metal Building Manufacturers Association</td>
<td>1300 Sumner Ave., Cleveland, OH 44115-2851</td>
<td>(216) 241-7333</td>
</tr>
<tr>
<td>MFMA</td>
<td>Maple Flooring Manufacturers Association</td>
<td>60 Revere Dr., Suite 500, Northbrook, IL 60062</td>
<td>(847) 480-9138</td>
</tr>
<tr>
<td>MIA</td>
<td>Marble Institute of America</td>
<td>30 Eden Alley, Suite 301, Columbus, OH 43215</td>
<td>(614) 228-6194</td>
</tr>
<tr>
<td>Organization</td>
<td>Address</td>
<td>Phone</td>
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| ML/SFA       | Metal Lath/Steel Framing Association  
P.O. Box 3928  
Birmingham, AL 35208 | (205) 787-2611 | www.naamm.org |
| MSS          | Manufacturers Standardization Society of the Valve and Fittings Industry  
127 Park St., NE  
Vienna, VA 22180-4602 | (703) 281-6613 | www.mss-hq.com |
| NAA          | National Arborist Association  
Route 101, P.O. Box 1094  
Amherst, NH 03031-1094 | (800) 733-2622  
(603) 673-3311 | www.natlarb.com |
| NAAMM        | National Association of Architectural Metal Manufacturers  
8 South Michigan Ave., Suite 1000  
Chicago, IL 60603 | (312) 332-0405 | www.naamm.org |
| NAAMM        | North American Association of Mirror Manufacturers  
(Division of GANA)  
2945 Southwest Wanamaker Dr., Suite A  
Topeka, KS 66614 | (913) 266-7013 | www.glasswebsite.com |
| NACE         | NACE International  
1440 South Creek Drive  
Houston, TX 77084 | (281) 228-6200 | www.nace.org |
| NAIMA        | North American Insulation Manufacturers Association  
44 Canal Center Plaza, Suite 310  
Alexandria, VA 22314 | (703) 684-0084 | www.naima.org |
| NBGQA        | National Building Granite Quarries Association, Inc.  
1220 L. St., NW, Suite 100-167  
Washington, DC 20005 | (800) 557-2848 | www.nbqga.com |
| NBS          | National Bureau of Standards | | |
| NCMA         | National Concrete Masonry Association  
2302 Horse Pen Rd.  
Herndon, VA 20171-3499 | (703) 713-1900 | www.ncma.org |
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<th>Association</th>
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<td>National Council on Radiation Protection and Measurement</td>
<td>(301) 657-2652</td>
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<tr>
<td></td>
<td>7910 Woodmont Ave., Suite 800</td>
<td></td>
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<td></td>
<td>Bethesda, MD 20814-3095</td>
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<td><a href="http://www.ncrp.com">www.ncrp.com</a></td>
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<tr>
<td>NEBB</td>
<td>National Environmental Balancing Bureau</td>
<td>(301) 977-3698</td>
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<tr>
<td></td>
<td>8575 Grovemont Circle</td>
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<td></td>
<td>Gaithersburg, MD 20877</td>
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<td><a href="http://www.nebb.org">www.nebb.org</a></td>
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<tr>
<td>NECA</td>
<td>National Electrical Contractors Association</td>
<td>(301) 657-3110</td>
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<tr>
<td></td>
<td>3 Bethesda Metro Center, Suite 1100</td>
<td></td>
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<td><a href="http://www.necanet.org">www.necanet.org</a></td>
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<td>NELMA</td>
<td>Northeastern Lumber Manufacturers Association</td>
<td>(207) 829-6901</td>
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<tr>
<td></td>
<td>272 Tuttle Rd.</td>
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<td></td>
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<td></td>
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<td><a href="http://www.nelma.org">www.nelma.org</a></td>
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<tr>
<td>NEMA</td>
<td>National Electrical Manufacturers Association</td>
<td>(703) 841-3200</td>
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<tr>
<td></td>
<td>1300 N 17th St., Suite 1847</td>
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<td></td>
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<td><a href="http://www.nema.org">www.nema.org</a></td>
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<td>NETA</td>
<td>International Electrical Testing Association</td>
<td>(303) 697-8441</td>
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<td>P.O. Box 687</td>
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<td>NFoPA</td>
<td>National Forest Products Association</td>
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<td>NFPA</td>
<td>National Fire Protection Association</td>
<td>(800) 344-3555</td>
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<td></td>
<td>One Battymarch Park</td>
<td>(617) 770-3000</td>
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<td></td>
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<td>NFRC</td>
<td>National Fenestration Rating Council</td>
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<td>NLGA</td>
<td>National Lumber Grades Authority</td>
<td>(604) 524-2393</td>
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<td>NOFMA</td>
<td>National Oak Flooring Manufacturers Association</td>
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<td>NPCA</td>
<td>National Paint and Coatings Association</td>
<td>(202) 462-6272</td>
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<td>NRCA</td>
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<td>(847) 299-9070</td>
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<td>NSF</td>
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<td>P.O. Box 130140</td>
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<td>NSPI</td>
<td>National Spa and Pool Institute</td>
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<td>NSWMA</td>
<td>National Solid Wastes Management Association</td>
<td>(800)424-2869</td>
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<td>Environmental Industry Associations</td>
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<td></td>
<td>4301 Connecticut Ave NW, Suite 300</td>
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| NTMA                                    | National Terrazzo and Mosaic Association  
110 E. Market St., Suite 200-A  
Leesburg, VA 20176               | (800) 323-9736  
(703) 779-1022                              |
| NUCA                                    | National Utility Contractors Association  
4301 North Fairfax Dr., Suite 360  
Arlington, VA 22203-1627              | (703) 358-9300                              |
| NWWDA                                   | National Wood Window & Door Manufacturers Association  
1400 East Touhy Avenue  
Suite 470  
Des Plaines, IL 60018                | (800) 223-2301                              |
| OSHA                                    | Occupational Safety and Health Association  
U.S. Department of Labor  
Office of Public Affairs - Room N3647  
200 Constitution Avenue  
Washington, D.C. 20210          | (202) 693-1999                              |
| PCA                                     | Portland Cement Association  
5420 Old Orchard Rd.  
Skokie, IL 60077                | (847) 966-6200                              |
| PCI                                     | Precast/Prestressed Concrete Institute  
209 W. Jackson Blvd.  
Chicago, IL 60606-6938          | (312) 786-0300                              |
| PDCA                                    | Painting and Decorating Contractors of America  
3913 Old Lee Hwy, Suite 33-B  
Fairfax, VA 22030             | (703) 359-0826                              |
| PDI                                     | Plumbing and Drainage Institute  
45 Bristol Dr.  
South Easton, MA 02375          | (800) 589-8956                              |
| PS                                      | Product Standard                                                          |                                        |
| PTI                                     | Post Tensioning Institute  
1717 W. Northern Ave., Suite 114  
Phoenix, AZ 85021            | (602) 870-7540                              |
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<th>Acronym</th>
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<td>RCSC</td>
<td>Research Council on Structural Connections</td>
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<td>RILEM</td>
<td>RILEM Secretariat General E N S - Bâtiment Cournot, 61 avenue du Président Wilson F-94235 Cachan Cedex, France</td>
<td>33 1 47 40 23 97</td>
</tr>
<tr>
<td>RIS</td>
<td>The Redwood Inspection Service 630 J Street Eureka, CA 95501</td>
<td>(707) 444-3024</td>
</tr>
<tr>
<td>RCSHSB</td>
<td>Southern Cypress Manufacturers Association 400 Penn Center Blvd., #530 Pittsburgh, PA 15235</td>
<td>(877) 607-7262</td>
</tr>
<tr>
<td>RMA</td>
<td>Rubber Manufacturers Association 1400 K Street, NW Suite 900 Washington, DC 20005</td>
<td>(202) 682-4846</td>
</tr>
<tr>
<td>SCMA</td>
<td>Southern Cypress Manufacturers Association 400 Penn Center Blvd., #530 Pittsburgh, PA 15235</td>
<td>(877) 607-7262</td>
</tr>
<tr>
<td>SDI</td>
<td>Steel Deck Institute P.O. Box 25 Fox River Grove, IL 60021</td>
<td>(847) 462-1930</td>
</tr>
<tr>
<td>SDI</td>
<td>Steel Door Institute 30200 Detroit Rd. Cleveland, OH 44145-1967</td>
<td>(440) 899-0010</td>
</tr>
<tr>
<td>SGCC</td>
<td>Safety Glazing Certification Council PO Box 9 Henderson Harbor, NY 13651</td>
<td>(315) 646-2234</td>
</tr>
<tr>
<td>SIGMA</td>
<td>Sealed Insulating Glass Manufacturers Association 401 N. Michigan Ave. Chicago, IL 60611</td>
<td>(312) 644-6610</td>
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SJII
Steel Joist Institute
3127 10th Ave., North Ext.
Myrtle Beach, SC 29577-6760
www.steeljoist.org
(843) 626-1995

SMACNA
Sheet Metal and Air Conditioning Contractors' National Association
4201 Lafayette Center Dr.
Chantilly, VA 20151-1209
www.smacna.org
(703) 803-2980

SPIB
Southern Pine Inspection Bureau
4709 Scenic Hwy
Pensacola, FL 32504-9094
www.spib.org
(850) 434-2611

SPRI
Single Ply Roofing Institute
200 Reservoir St., 309 A
Needham, MA 02494
www.spri.org
(781) 444-0242

SSPC
SSPC: The Society for Protective Coatings
40 24th St., 6th Floor
Pittsburgh, PA 15222-4656
www.sspc.org
(800) 837-8303
(412) 281-2331

STI
Steel Tank Institute
570 Oakwood Rd.
Lake Zurich, IL 60047
www.steeltank.com
(847) 438-8265

SWI
Steel Window Institute
1300 Sumner Ave.
Cleveland, OH 44115-2851
www.steelwindows.com
(216) 241-7333

SWRI
Sealant, Waterproofing and Restoration Institute
2841 Main St.
Kansas City, MO 64108
www.swrionline.org
(816) 472-7974

TCA
Tile Council of America, Inc.
100 Clemson Research Blvd.
Anderson, S.C. 29625
www.tileusa.com
(864) 646-8453

TIA/EIA
Telecommunications Industry Association/Electronic Industries Alliance
2500 Wilson Blvd., Suite 300
Arlington, VA 22201
www.tiaonline.org
(703) 907-7700
TMS      The Masonry Society
         3970 Broadway, Suite 201-D
         Boulder, CO 80304-1135
         www.masonrysociety.org
         (303) 939-9700

TPI      Truss Plate Institute
         583 D’Onofrio Dr., Suite 200
         Madison, WI 53719
         (608) 833-5900

TPI      Turfgrass Producers International
         1855-A Hicks Rd.
         Rolling Meadows, IL 60008
         www.turfgrass.org
         (800) 405-8873
         (847) 705-9898

UL       Underwriters Laboratories Inc.
         333 Pfingsten Rd.
         Northbrook, IL 60062-2096
         www.ul.com
         (847) 272-8800

WCLIB    West Coast Lumber Inspection Bureau
         P.O. Box 23145
         Portland, OR 97281
         www.wclib.org
         (503) 639-0651

WDMA     Window and Door Manufacturers Association
         1400 E. Touhy Ave., Suite 470
         Des Plaines, IL 60018
         www.nwwda.org
         (800) 223-2301

WH       Intertek Testing Services
         Warnock Hersey Listing Services
         3210 American Drive
         Mississauga, Ontario
         Canada L4V 1B3
         www.itsqs.com
         (905) 678-7820

WIC      Woodwork Institute of California
         3164 Industrial Blvd.
         West Sacramento, CA 95691
         www.wicnet.org
         (916) 372-9943

WRI      Wire Reinforcement Institute
         W.R.I. Technical Director
         301 E. Sandusky Street
         Findlay, Ohio 45840-0450
         www.bright.net/~wwri
         (419) 425-9473
PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION 01 42 19
SECTION 01 45 29
TESTING LABORATORY SERVICES

PART 1 – GENERAL

1.01 GENERAL
A. Owner shall employ and pay for the services of an Independent Testing Laboratory to perform specified services and testing.
B. Employment of laboratory shall in no way relieve Contractor’s obligations to perform the Work of the Contract.

1.02 RELATED REQUIREMENTS
A. Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities.
B. Inspections and testing required by Contract Documents: Respective sections of Specifications.
C. Certification of products: Respective sections of Specifications.

1.03 QUALIFICATIONS OF LABORATORY:
A. Meet “Recommended Requirements for Independent Laboratory Qualification”, published by American Council of Independent Laboratories.
B. Meet basic requirements of ASTM E 329, “Practice for Use in the Evaluation of Inspection and Testing Agencies as Used in Construction” and ASTM E543, “Practice for Determining the Qualification of Nondestructive Testing Agencies.”
C. Authorized to operate in the State of Texas.
D. Acceptable to Architect/Engineer and approved in writing by Owner.
E. Under the direction of a Registered Engineer licensed in the State of Texas and having a minimum of five (5) years engineering experience in inspection and testing of construction materials.
F. Testing equipment calibrated at twelve (12) month intervals by devices of accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants. Submit copies of certificates of calibration.
G. Voluntarily participate in American Association of Laboratory (A2LA) accreditation program.
   1. Laboratory shall possess a current Scope of Accreditation Certificate in type of tests required for the project.
   2. Testing and inspection services performed at laboratory facility which has received A2LA accreditation, unless Owner specifically approves an alternate
A2LA accredited laboratory or an acceptable project QA/QC program which provides for an adequate "extension" of accredited laboratory. Such an "extended" laboratory which will operate more than a year must be separately assessed and accredited. A temporary field or project laboratory operating less than a year shall be under the full time supervision of management from an accredited laboratory. Test reports produced by the temporary field or project laboratory shall be signed by one of the accredited laboratory's signatories.

H. Inspectors and technicians with demonstrated competence in performing relevant tests and inspections and under direct supervision of persons meeting following requirements:
1. NICET Level II Certification in concrete, soils; or ACI Level II Certification in concrete.
2. AWS Certified Welding Inspector in structural steel field.
3. ASNT Level II Certification in Radiographic or Ultrasonic Nondestructive Testing of shop and field welding.

1.04 AUTHORITY AND DUTIES OF LABORATORY

A. Cooperate with Owner, Architect and Contractor; provide qualified personnel after due notice.

B. Perform specified inspections, sampling and testing of materials and methods of construction.

C. Promptly notify Owner, Architect and Contractor of observed irregularities or deficiencies of Work or products.

D. Laboratory is not authorized to:
1. Release, revoke, alter or enlarge on requirements of Contract Documents.
2. Approve or accept any portion of the Work.
3. Perform any duties of the Contractor.

E. Promptly submit written report of each test and inspection; 1 copy each to Architect, 1 copy to Structural Engineer and Owner and one copy to Contractor. Each report shall include:
1. Date issued.
2. Project title and number.
3. Testing laboratory name, address and telephone number.
4. Name and signature of laboratory inspector/technician and responsible reviewer.
5. Date and time of sampling or inspection.
6. Record of temperature and weather conditions.
7. Date of test.
8. Identification of product and Specification Section.
9. Location of sample or test in the Project.
10. Type of inspection or test.
11. Results of tests and compliance with Contract Documents.
12. Interpretation of test results that indicate unsatisfactory conditions.

F. Submit certificates of testing, inspection or approval that are required by laws, ordinances, rules, regulations, orders or approval of public authorities. Submit same number of copies as required for tests and inspections.
G. Combining tests from various buildings or differing areas into a single report shall be prohibited. Each test report shall be limited to a single building or area.

1.05 CONTRACTOR'S RESPONSIBILITIES

A. Cooperate with laboratory personnel and provide access to Work or to manufacturer's operations.

B. Deliver to laboratory adequate quantities of representative samples of materials proposed for use and which require testing.

C. Notify laboratory and Owner sufficiently in advance of operations (minimum of 48 hours) to allow for laboratory assignment of personnel and scheduling of tests.

D. Furnish incidental labor and facilities:
   1. To provide access to Work to be tested.
   2. To obtain and handle samples at Project site or at source of product to be tested.
   3. For storage and curing of test samples.

E. For Owner's Quality Assurance inspection and testing, furnish same incidental labor and facilities specified in this Article for Contractor's Quality Control Testing.

F. Make arrangements with laboratory and pay for additional samples and tests required for Contractor's convenience, including additional compressive strength tests required to confirm strength requirements for early form recovery.

G. Make arrangements with laboratory and pay for services to perform additional inspections, sampling and testing required when initial tests indicate Work does not comply with Contract Documents.

H. Coordinate and integrate inspection and testing services with Contractor's Quality Control Plan/Program, including:
   1. Compile and submit a complete list of inspections and tests required by the Contract Documents. List shall include test name, frequency, specification reference, and estimate of quantities.
   2. Record results of inspections and test conducted at site on appropriate Quality Control Reports.
   3. Record results of off-site inspections and tests on appropriate Quality Control Reports.

1.06 OWNER'S QUALITY ASSURANCE INSPECTION AND TESTING

A. The Owner may, from time to time, perform additional Quality Assurance inspections and testing in accordance with the General Conditions.
   1. The Owner will employ and pay for services of an independent testing laboratory to perform any additional Quality Assurance inspections and testing.

B. Quality Assurance inspections and testing conducted by the Owner's Quality Assurance Laboratory shall not relieve the Contractor from performing inspections and tests required by the Contract Documents or regulatory agencies.

C. The Owner reserves the right to utilize the Contractor's on-site Quality Control Laboratory Facilities, if any, for incidental handling, curing or storage of Quality Assurance samples.
PART 2 – PRODUCTS
Not Applicable.

PART 3 – EXECUTION
Not Applicable.

END OF SECTION 01 45 29
PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings, General Conditions of the Contract for Construction, Supplementary Conditions and Division 1 - General Requirements apply to Work of this section.

1.02 SECTION INCLUDES

A. Temporary Utilities: Electricity, water, and sanitary facilities.
B. Temporary Controls: Barriers, protection of the Work, and water control.
C. Construction Facilities: Progress cleaning.

1.03 RELATED SECTIONS

A. Section 01 77 00 – Closeout Procedures: Final cleaning.

1.04 TEMPORARY ELECTRICITY

A. Contractor may use existing building electrical system for construction related power requirements.
B. Owner shall pay cost of energy used. Exercise measures to conserve energy.
C. Power Service Characteristics Available: Verify at site.

1.05 TEMPORARY SANITARY FACILITIES

A. County shall provide and maintain required portable facilities and enclosures. Privy pits shall not be used. Permanent building facilities shall not be used during construction operations.
B. Coordinate location of portable facilities with Owner and Architect.

1.06 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, and to protect adjacent properties from damage from construction operations.
B. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

1.07 WATER CONTROL

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

1.08 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Provide temporary and removable protection for installed Products. Control activity in immediate Work area to minimize damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

1.09 PARKING

A. Contractor may use owner’s surface parking areas in existing parking lot at location specified by Owner to accommodate construction personnel.

1.10 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

D. Remove waste materials, debris, and rubbish from site and dispose off-site at intervals as required to maintain clean site. Maximum interval for clean-up shall be daily.

1.11 FIELD OFFICES AND SHEDS

A. Contractor may use work area as temporary field office.

B. Coordinate location of office(s) and storage facilities with Owner and Architect.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

END OF SECTION 01 50 00
SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 – GENERAL

1.01 SUMMARY

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

B. Related Sections include the following:
   1. Division 1 Section "Reference Standards" for applicable industry standards for products specified.
   2. Division 1 Section "Closeout Procedures" for submitting warranties for Contract closeout.
   3. Divisions 2 for specific requirements for warranties on products and installations specified to be warranted.

1.02 DEFINITIONS

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

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

1.03 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Agreement.
   2. For products specified only by reference standards, list applicable reference standards.
B. Substitution Requests: Submit three (3) copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Contractor to submit written request for Substitution that varies from the Contract Documents utilizing form provided.

2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
   a. Statement indicating why specified material or product cannot be provided.
   b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
   c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
   d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
   e. Samples, where applicable or requested.
   f. List of similar installations for completed projects with project names and addresses and addresses of owners.
   g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
   h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
   i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
   j. Cost information, including a proposal of change, if any, in the Contract Sum.
   k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
   l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect, Architect's Consultant's or Owner's consultant will request additional information or documentation for evaluation within seven (7) days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within fifteen (15) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.

C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.
1.04 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
   1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
   2. If a dispute arises between contractors over concurrently selectable but incompatible products, Owner’s consultant will determine which products shall be used.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:
   1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
   2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
   3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
   4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

C. Storage:
   1. Store products to allow for inspection and measurement of quantity or counting of units.
   2. Store materials in a manner that will not endanger Project structure.
   3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
   4. Store cementitious products and materials on elevated platforms.
   5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
   6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
   7. Protect stored products from damage and liquids from freezing.
   8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.06 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
   1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
   2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
   3. Refer to Divisions 2 for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 – PRODUCTS

2.01 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
   1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
   2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
   3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
   4. Where products are accompanied by the term "as selected," Owner's consultant will make selection.
   5. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.

B. Product Selection Procedures:
   1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
   2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
   3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
   4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
   5. Available Products: Where Specifications include a list of names of both products
and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.

6. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.

7. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.

8. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.

2.02 PRODUCT SUBSTITUTIONS

A. Timing: Architect, Architect’s Consultants or Owner’s consultant may consider requests for substitution if received after commencement of the Work. Requests received after that time may be considered or rejected at discretion of reviewer.

B. Conditions: Architect or Owner's consultant will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Owner's consultant will return requests without action, except to record noncompliance with these requirements:

1. Substitution Request Form: Contractor to submit written request for Substitution that varies from the Contract Documents utilizing provided form.

2. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Owner's consultant for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.

3. Requested substitution does not require extensive revisions to the Contract Documents.

4. Requested substitution is consistent with the Contract Documents and will produce indicated results.

5. Substitution request is fully documented and properly submitted.

6. Requested substitution will not adversely affect Contractor's Construction Schedule.

7. Requested substitution has received necessary approvals of authorities having jurisdiction.

8. Requested substitution is compatible with other portions of the Work.

9. Requested substitution has been coordinated with other portions of the Work.

10. Requested substitution provides specified warranty.

11. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent,
is compatible with other products, and is acceptable to all contractors involved.

PART 3 – EXECUTION

Not Used.

END OF SECTION 01 60 00
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements for field engineering services including, but not necessarily limited to, the following:
   1. Land survey Work required for layout of site. Site shall include work by General Contractor and that of the Owner for the work areas including site improvements, parking areas, and site utilities.

   B. All costs shall be included in the contract sum.

1.03 SUBMITTALS

A. Certificates: Submit a certificate signed by the Land Surveyor or Professional Engineer certifying that the location and elevation of improvements comply with the Contract Documents.

B. Final Property Survey: Submit 5 copies of the final property survey.

C. Project Record Documents: Submit a record of Work performed and record survey data as required under provisions of Sections “Submittals” and “Contract Closeout”.

1.04 QUALITY ASSURANCE

A. Surveyor: Engage a Registered Land Surveyor to perform land surveying services required.

Part 2 – PRODUCTS

Not Applicable.

Part 3 – EXECUTION

3.01 EXAMINATION

A. The Owner will identify existing control points and property and property line corner stakes.

B. Verify layout information shown on the Drawings, in relation to the property survey and existing benchmarks before proceeding to lay out the Work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during
construction.
1. Do not change or relocate benchmarks or control points without prior written approval. Promptly report lost or destroyed reference points, or requirements to relocate reference points because of necessary changes in grades or locations.
2. Promptly replace lost or destroyed project control points. Base replacements on the original survey control points.

C. Establish and maintain a minimum of two permanent benchmarks on the site, referenced to data established by survey control points.
   1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

D. Existing utilities and equipment: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities and other construction.
   1. Prior to construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer and water service piping.

3.02 PERFORMANCE

A. Working from lines and levels established by the property survey, establish benchmarks and markers to set lines and levels at each story of construction and elsewhere as needed to properly locate each element of the Project. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions.
   1. Advise entities engaged in construction activities of marked lines and levels provided for their use.
   2. As construction proceeds, check every major element for line, level and plumb.

B. Site Improvements. Locate and lay out site improvements, including pavements, stakes for grading, fill and topsoil placement, utility slopes and invert elevations by instrumentation and similar appropriate means.

C. Existing Utilities: Furnish information necessary to adjust, move or relocate existing structures, utility poles, lines, services or other appurtenances located in, or affected by construction. Coordinate with local authorities having jurisdiction.

D. Final Property Survey: Before Substantial Completion, prepare a final property survey showing significant features (real property) for the project. Include on the survey a certification, signed by the surveyor, to the effect that principal metes, bounds, lines and levels of the project are accurately positioned as shown on the survey.

END OF SECTION 01 71 23
SECTION 01 73 29
CUTTING AND PATCHING

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

A. Requirements and limitations for cutting and patching of Work.

1.02 DESCRIPTION

A. Execute cutting including excavating, fitting and patching required to complete Work or to:
   1. Make several parts fit properly.
   2. Uncover portions of Work to provide for installation of ill-timed Work.
   3. Remove and replace defective work.
   4. Remove and replace work not conforming to requirements of Contract Documents.
   5. Remove samples of installed work as specified for testing.
   6. Provide penetrations of non-structural surfaces for installation of piping and conduit.

B. In addition to contract requirements, upon written instructions of Architect:
   1. Uncover work to provide for Architect observation of covered work.
   2. Remove samples of installed materials for testing.
   3. Remove work to provide for alteration of completed work.

C. Do not cut into or cut away structural members nor excavate beneath foundations or load bearing structures without proper notification and approval from Architect/Engineer.

1.03 SUBMITTALS

A. Submit written notice to Architect in advance of executing cutting which affects:
   1. Work of Owner or any separate contractor.
   2. Structural integrity of Work, including:
      a. Foundation construction.
      b. Masonry walls and other bearing walls.
      c. Structural concrete.
   3. Integrity of weather exposed or moisture resistant elements.
   4. Efficiency, operation or maintenance of operational equipment.
   5. Visual qualities of sight-exposed elements.

B. Request shall include:
   1. Identification of project, description and location of affected work (referenced to drawing sheet and column lines), necessity for cutting, effect on other Work, effect on structural integrity of Project, description of proposed work. Designate:
      a. Scope of cutting and patching.
      b. Trades to execute work.
      c. Products proposed to be used.
      d. Extent of refinishing.
2. Alternatives to cutting and patching.
3. Written permission of separate contractor whose work will be affected.

C. Should conditions of Work, or schedule, indicate change of materials or methods, submit written recommendation to Architect, including:
   1. Conditions indicating change.
   2. Recommendations for alternative materials or methods.

D. Submit written notice to Architect (at least 48 hours in advance) designating time work will be uncovered to provide for observation.

PART 2 – PRODUCTS

2.01 MATERIALS

A. For replacement of work removed, comply with Specifications for each specific product involved. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine existing conditions of Work, including elements subject to movement or damage during cutting and patching and during excavation and backfilling.

B. After uncovering work, examine conditions affecting installation of new products, or performance of work.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Provide temporary shoring, bracing and support to maintain structural integrity of affected portion of Work.

B. Provide protection for other portions of Work.

C. Provide protection from elements for portion of Work which may be exposed by cutting and patching, and maintain excavations free of water.

3.03 PERFORMANCE

A. Execute fitting and adjustment of products to provide finished installation to comply with specified products, functions, tolerances and finishes.
B. Execute cutting and demolition by methods which will prevent damage to other work and will provide proper surfaces to receive installation of repairs and new work.
   1. Neatly cut and remove materials, and prepare openings to receive new work.
   2. Remove masonry or concrete in small sections.
   3. Provide shoring, bracing, and other supports to prevent movement, settlement, or collapse of remaining or adjacent wall areas, structure, or facilities.
   4. Arrange shoring, bracing, and supports to prevent overloading of structure.

C. Execute excavating and backfilling by methods which will prevent damage to other work and will prevent settlement.

D. Restore work which has been cut or removed; install new products to provide completed Work in accord with requirements of Contract Documents.

E. Refinish sight-exposed surfaces to provide specified uniform finish to match adjacent finishes:
   1. Continuous surfaces: to nearest intersections.
   2. Assembly: entire refinishing.

F. Fit work airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.

G. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
   1. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
   2. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.

3.04 CUTTING IN CONCRETE CONSTRUCTION

A. Do not cut into nor core drill concrete beams, joists, lintels, and columns.

B. Do not install sleeves in concrete beams, joists, columns, and pre-cast panels without prior written approval of Architect.

C. When written approval is obtained, comply with additional requirements and instructions of Architect.

3.05 CUTTING IN CONCRETE MASONRY WALLS

A. Do not cut into grouted lintels or bond beams without Architect's approval.

B. Utilize steel angle lintels for all openings in excess of 24" in width. Submit lintel size and proposed installation method to Architect for approval prior to beginning work.
C. When written approval is obtained, comply with additional requirements and instructions of Architect.

3.06 CLEAN UP

A. Remove debris, rubbish, and materials resulting from cutting and patching operations.

B. Transport materials and legally dispose of offsite.

END OF SECTION 01 73 29
SECTION 01 77 00
CLOSEOUT PROCEDURES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS
A. Drawings and general provisions of Contract, including General and Supplementary
Conditions and other Division-1 Specification Sections, apply to this section.

1.02 SECTION INCLUDES
A. Administrative and procedural requirements for project closeout, including but not limited
to:
1. Inspection procedures.
2. Project record document submittal.
3. Operating and maintenance manual submittal.
4. Submittal of warranties.
5. Final cleaning.

1.03 RELATED SECTIONS
A. Closeout requirements for specific construction activities are included in the appropriate
sections in Divisions 1 through 2.

1.04 SUBSTANTIAL COMPLETION
A. Preliminary Procedures: Before requesting inspection for certification of substantial
completion, complete the following. List exceptions in the request.
1. In the application for payment that coincides with, or first follows, the date
substantial completion is claimed, show 100 percent completion for the portion of
the Work claimed as substantially complete. Include supporting documentation
for completion as indicated in these contract documents and a statement showing
an accounting of changes to the contract sum.
   a. If 100 percent completion cannot be shown, include a list of incomplete
   items, the value of incomplete construction, and reasons the Work is not
   complete.
2. Advise Owner of pending insurance change-over requirements.
3. Submit specific warranties, workmanship bonds, maintenance agreements, final
certifications and similar documents.
4. Obtain and submit releases enabling the Owner unrestricted use of the Work and
   access to services and utilities.

B. Final Site Visit for Substantial Completion Procedures: On receipt of a request for site
visit, the Architect will either proceed with site visit, "Punch List", or advise the Contractor
of unfilled requirements. The Architect will prepare the certificate of substantial
completion following site visit, or advise the Contractor of construction that must be
completed or corrected before the certificate will be issued.
1. The Architect will repeat site visit when requested and assured by the Contractor
that the Work has been completed.
1.05   **FINAL ACCEPTANCE**

A. Preliminary Procedures: Before requesting final site visit for certification of final acceptance and final payment, complete the following.
   1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
   2. Submit an updated final statement, accounting for final additional changes to the contract sum.
   3. Submit a certified copy of the Architect's final site visit list, "Punch List", of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Architect.
   4. Submit consent of surety to final payment.
   5. Submit a final liquidated damages settlement statement.
   6. Submit certified and executed final "Release or Waiver of Liens" for the Contractor, all subcontractors, material suppliers and all other entities which have supplied Work, materials or products to the job.

B. Re-inspection Procedure: The Architect will revisit the Work upon receipt of notice that all the Work, including Punch List items from earlier site visits, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Architect.
   1. Upon completion of first re-inspection, the Architect will prepare a certificate of final acceptance, or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

PART 2 – PRODUCTS

   Not Used.

PART 3 – EXECUTION

3.01   **FINAL CLEANING**

A. General: General cleaning during construction is required by the general conditions and included in Section 01 50 00 "Temporary Facilities and Controls".

B. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.

C. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.
   1. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION 01 77 00